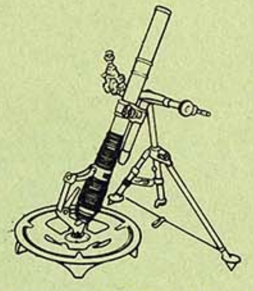
FC 7-90-1

TACTICAL EMPLOYMENT OF THE 60-MM MORTAR SECTION



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TACTICAL EMPLOYMENT OF THE 60-MM MORTAR SECTION

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PREFACE

This circular prescribes interim doctrine for the tactical employment of the 60-mm mortar section by airborne, air assault, light infantry, and ranger companies. This circular does not stand alone. It is intended to be used with field manual (FM) 7-90 and is written for the commander, staff, and leaders of units equipped with the M224 mortar. The contents of this circular will be incorporated into a future revision of FM 7-90.

Users of this circular should make full use of other doctrinal, training, and technical publications pertaining to mortars. FM 7-10 discusses the doctrinal employment of the rifle company. Soldier's Training Publications (STP) 7-11C1-SM and 7-11C24-SM contain training tasks applicable to the 60-mm mortar section. FM 23-36(Test) describes the technical aspects of operating the M224 mortar. TC 23-90 contains training information relevant to the mortar section. TM 9-1010-223-10 contains operator's maintenance information.

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Unless otherwise stated, whenever the masculine gender is used, both men and women are included.

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CHAPTER 1

INTRODUCTION

1-1 LIGHT MORTARS ON THE BATTLEFIELD

a. The 60-mm mortar, M224, provides the mortar sections of the light infantry, air assault, airborne and ranger infantry battalions an effective, efficient, and flexible weapon. The inherent limitations of this mortar (short range and small explosive charge) can be minimized by careful planning and a thorough knowledge of its capabilities.

b. The rifle company commander depends on mortars and the field artillery to provide close fire support, suppression, smoke, and illumination. Light mortars provide him the most responsive and versatile source of indirect fire support available. Their maneuverability, high rate of fire, low minimum range restrictions, lethality, and proximity to the commander ensure the versatility, reliability, and responsiveness needed in light infantry operations. Because of the demands placed on field artillery assets by counterfire, suppression, interdiction, and the employment of special munitions in nontraditional artillery roles, infantry leaders must plan and train well to ensure that mortar sections provide the needed suppport in combat.

c. High-angle trajectories and multiple-fuze options allow mortars to attack targets effectively:

- In defilade on hilly, mountainous, or rolling terrain.
- Under jungle canopies.

- On marshy or snow covered terrain.

- Behind buildings and on rooftops and top floors.

The short minimum range of the M224 makes the mortar well suited for close-in protective fires against an assaulting enemy, for block-to-block fighting in cities, and combat over close terrain with restricted visibility.

d. The light mortar section can be positioned between buildings, in confined areas, and on rough terrain. Light mortars are easy to conceal, can accompany raiding and counterattacking forces, can remain at the forward edge of the battle until the last moment, and can be moved with stealth. The proximity of the mortar section to the supported rifle platoons makes communications by wire, runner, and other means possible when electronic warfare conditions prohibit or limit radio contact with artillery systems. The maneuverability of light mortars allows continuity of close fire support over the distances expected in light infantry combat.

e. Commanders can increase the effectiveness of their light mortars by:

(1) Stressing the continuous integration of mortar fire into the overall fire support plan.

(2) Stressing the value of mortars to the close-in infantry battle.

(3) Seeking and developing innovative ways of requesting and controlling mortar fires so that mortars can provide full support to the infantryman.

(4) Ensuring that the timely resupply of mortar ammunition is considered and included in the plan for logistical support.

1-2. THE AIRLAND BATTLE. Success on the battlefield depends on the ability to fight in accordance with the four tenets of the AirLand Battle.

a. Initiative. Initiative is gained and maintained by effective fire and battlefield maneuver. Light mortars can contribute to gaining initiative by providing immediate, flexible fire support capable of destroying or disrupting enemy forces during offensive or defensive operations. The 60-mm mortar section focuses on supporting the rifle platoons of the company, and responds to company fire missions only, unless directed by the commander. The section responds quickly to changes in the tactical situation and can continue to engage the enemy without extensive coordination by the company commander.

b. Depth. The range of the 60-mm mortar (approximately 3,400 meters) gives the company commander the ability to attack the enemy beyond the range of most direct-fire weapons. It allows him to support elements moving into position to attack the enemy and provides lethal close-in fire during defensive operations.

c. Agility. Agility means quick thinking, prompt reaction, and rapid movement. The company mortar section is a small, cohesive unit that can respond quickly to the commander's instructions, move rapidly, and immediately engage targets. The light weight of the M224 system allows the section to accompany the rifle platoons on airborne or air assault operations and over rugged terrain. The mortar section's capability to displace and emplace quickly gives the commander the ability to rapidly shift fires.

d. Synchronization. Synchronization is teamwork, coordination of effort, and effective employment of the combined arms team. Combining the fire of the mortar section with that of the rifle squads, Dragons, and machine gun teams of the company, produces a greater effect on the enemy than any single element could alone. Light mortar fire either kills the enemy or suppresses his fire and allows assault elements to close and kill him. Mortar fire causes enemy armored forces to button up, denying them good fields of view and allowing short and medium range antiarmor weapon teams to move to firing positions. Mortar final protective fires halt the enemy's advance, destroying his momentum and preparing the way for friendly forces to counterattack.

1-3. THE COMPANY MORTAR SECTION

a. Characteristics and Capabilities.

(1) FM 23-36 (Test) describes the technical characteristics and fire control equipment of the 60-mm mortar. For planning, the maximum range of the M224 (bipod-mounted) is 3,400 meters and the minimum range is 70 meters. The maximum range, when firing in the hand-held mode, is 1,300 meters.

(2) The M224 mortar fires the M720 high-explosive (HE) round as standard A ammunition. The M720 is equipped with a highly effective multioption fuze. This fuze/shell combination allows greater flexibility for the mortar section when engaging a variety of targets. The HE round weighs about 4 pounds. It can be set to function in any of four modes. These are proximity (PRX), near surface burst (NSB), impact (IMP), or delay (DLY).

(3) Standard B ammunition, developed for the M2 and M19 60-mm mortars, can be fired from the M224. Firing data for this older ammunition are given in FT (firing table) 60-P-1. The maximum range for the older HE round (M49A43) is 1,900 meters; for the M302A1 white-phosphorus (WP) round, 1,600 meters; and for the M83A3 illumination round, 950 meters. At longer ranges, the standard B ammunition is not as accurate or reliable as the M720 round.

(4) New smoke rounds (M722) and illumination rounds (M721) are being developed. They will be capable of engaging targets at the same range as the M720 HE round and will increase the flexibility of the mortar section.

b. Organization.

(1) The organization of the 60-mm mortar section in the rifle company is based on the company's specific table of organization and equipment (TOE). It is a separate section in the airborne, air assault, and light infantry rifle company. It is part of the weapons platoon in the ranger rifle company.

(2) Light mortar sections are made up of two squads, each consisting of one mortar and its crew. In the airborne, air assault, and light infantry rifle companies the senior squad leader is also the section leader. He is directly responsible to the company commander. The organization of these mortar sections is shown in Figure 1-1. There are no fire direction center (FDC) personnel in the airborne, air assault, or light infantry mortar sections. The mortar section sergeant coordinates closely with the company FIST chief to maximize the effect of the section's fire.

(3) Since there is no heavy or medium mortar platoon in the ranger battalion, the organic indirect fire support is provided by the 60-mm mortar section in the weapons platoon of each company. The ranger company's light mortar section has the same three-man squads as found in the other infantry organizations, but in addition it has a separate section sergeant (E-7) and a single fire direction center (FDC) computer. The forward observers (FO) and the fire support team (FIST) chief in the ranger battalion are assigned rather than attached. This facilitates a close relationship between the ranger mortar section sergeant and the FIST.

c. Equipment. The equipment carried by the mortar section minimizes weight yet allows the section to perform all of the functions of a true indirect fire team. Section members are armed for self-protection with either M16 rifles (section sergeant and squad leader) or pistols (gunners and ammunition bearers). Each squad is equipped with a complete M224 mortar (baseplates, barrel, bipod, sight, and aiming stakes) as well as fire control equipment (binoculars, M2 compass, M19 plotting board) and communication equipment (TA-1 telephone). The section sergeant has an M115 boresight and an AN/PRC-77 radio. In the near future the section will be issued two M23 mortar ballistic computors (MBC).

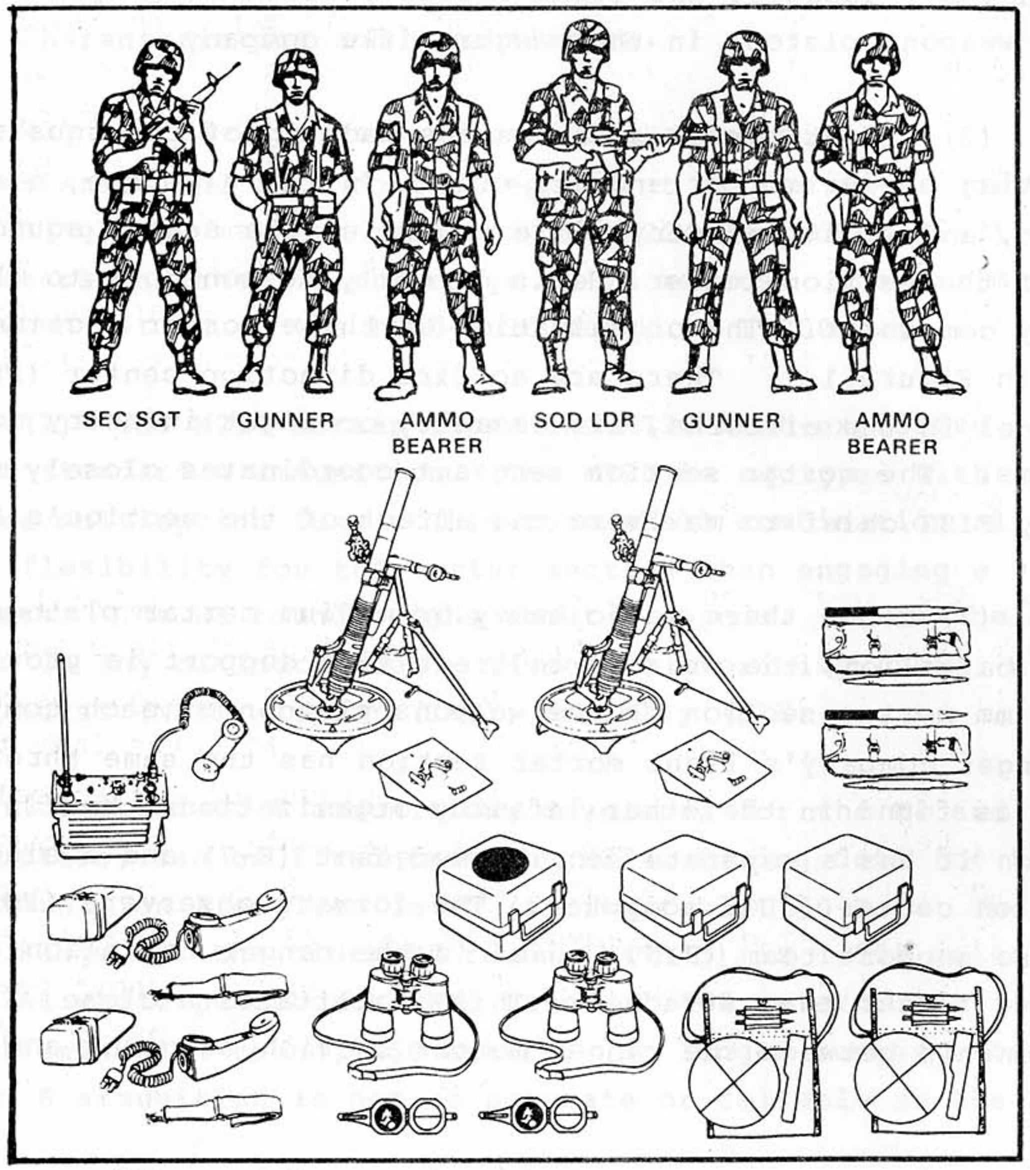


Figure 1-1. Equipment and organization.

CHAPTER 2

LEADING THE MORTAR SECTION

2-1. LEADERSHIP. The mortar section sergeant is responsible for the discipline, training, welfare, and morale of his men. His primary duty is to ensure the section provides effective indirect fire support to the company. To do so, he must gain the confidence, respect, and cooperation of his men. He can achieve that by demonstrating good leadership, a keen knowledge of human nature, and tactical proficiency. He must set an example. He controls the section by voice or hand-and-arm signals. He moves to critical locations to direct fire. He analyzes the tactical situation and makes decisions within his authority while executing the company commander's intent. He must be an expert on the technical aspects of the 60-mm mortar, FO procedures, and fire control.

2-2. RESPONSIBILITIES

a. The company commander is responsible for tactical employment of the mortar section. He assigns missions and priority of fires, allocates priority targets, designates general firing locations, and approves fire plans. He determines the appropriate command relationships. He plans for logistical support, determining the amount and components of the ammunition load, and its distribution and resupply. The commander must be especially concerned with ammunition resupply since a mortar section can fire large amounts of ammunition in a short period. A 60-mm mortar section can fire 280 rounds in 5 minutes. At that rate, the ammunition supply of a unit can drop rapidly.

b. The ranger weapons platoon leader is the primary advisor to both the company commander and the FIST chief on the tactical employment of the ranger company's mortar section. He recommends employment techniques and positions the section to support the scheme of maneuver. He assists the commander and FIST chief in developing the company fire plan and keeps them aware of the ammunition status and any range or mask problems. The weapons platoon leader leads the reconnaissance party, reconnoitering new positions and routes for the section based on the company commander's guidance and the enemy situation. He supervises the execution of orders and ensures that security measures are taken to protect the section. The platoon leader lays the mortars for firing, when required.

c. The mortar section sergeant in the airborne, air assault, and light infantry company is generally responsible for all the duties of a platoon leader, as well as acting as the squad leader of one of the two mortar squads. He is specifically responsible for:

(1) Controlling section movement and fires.

(2) Placing the section into position.

(3) Ensuring that both mortars are properly laid.

(4) Ensuring that emplaced mortars have mask and overhead clearance.

(5) Ensuring that semipermanent mortar positions are dug-in and camouflaged.

(6) Ensuring that ammunition is properly prepared.

(7) Briefing the section on the commander's orders.

(8) Plotting fires and determining firing data.

(9) Supervising maintenance and boresighting.

(10) Training section members in individual and crew-related skills; and cross-training to maintain technical proficiency.

(11) Supervising the distribution of loads within the section and the cross-leveling of ammunition between squads.

(12) Controlling the rate and amount of fire used to engage targets, and designating the appropriate type of round and fuze setting.

d. The other mortar squad leader is responsible for the same duties as the section sergeant when operating as a separate squad. He is responsible for acting as the section sergeant in the sergeant's absence.

e. The specific duties of the gunner and ammunition bearer are described in FM 23-36(Test). In the light mortar section, the ammunition bearer also acts as assistant gunner.

2-3. TROOP LEADING PROCEDURES

a. The section sergeant applies the troop leading procedures to prepare the mortar section for each tactical mission. The eight steps of the troop leading process are listed below. See FM 7-90 for more information on troop leading procedures.

Step 1. Receive the mission.
Step 2. Issue a warning order.
Step 3. Make a tentative plan.
Step 4. Start necessary movement.
Step 5. Reconnoiter.

Step 6. Complete the plan.
Step 7. Issue the complete order.
Step 8. Supervise.

b. All steps in troop leading may not be followed in sequence; some steps may be accomplished together. There is rarely time in combat to perform each step in detail. However, the leader mentally checks the list to ensure that all requirements are considered. This checking begins when he is alerted for a mission, and it is repeated as the situation changes.

CHAPTER 3

TACTICAL EMPLOYMENT

3-1. EMPLOYMENT TECHNIQUES

The maneuver commander employs the mortar section based on his analysis of the mission, the enemy, the terrain and weather, the troops, and the time available. The company commander has two options when considering how to employ the 60-mm mortar section: as a complete section, or by squad.

a. When the commander employs the mortar unit as a section, it operates from a single firing position under the control of the section sergeant. Both mortars engage the same target. The distance between mortars is normally 25 to 30 meters. This dispersion protects the section from enemy fire and ensures that the bursting radii of the rounds overlap. The section sergeant passes fire commands to the mortar squads by voice or over wire. In order to maximize its responsiveness, the light mortar section normally operates from a position near the rifle platoons. It engages targets as quickly as possible, often using fire without an FDC. If fire with an FDC is used, one of the two squads is designated by section standing operating procedure (SOP) as the base squad. The section does not normally adjust the sheaf by firing. Once one mortar has been adjusted onto a target, the remaining mortar is laid parallel by reciprocal lay using the mortar sights. (see FM 23-36).

b. When the commander employs the mortar unit by squad, he utilizes both squads as separate firing units. They may fire at the same target, but most often they engage different targets. Employment by squad may take place during the initial phases of airborne or air assault operations, or while supporting special requirements such as:

(1) Reinforcing an element conducting a combat patrol.

(2) Reinforcing the advance guard.

(3) Supporting an antiarmor ambush.

(4) Performing one-mortar illumination missions.

(5) Infiltrating the company along multiple routes.

(6) Supporting detachments left in contact.

(7) Displacing by bounds to provide continuous support during movement by the company.

c. When the section is employed by squad, the normal method of fire control is either direct-lay or direct-alignment. The squad leader acts as the FDC if one is used. He uses the MBC or the M19 plotting board and the graphical firing scale (GFS) to compute the deflection, elevation, and charge data.

d. Employment by squad is the less desirable method. It should be used as a temporary measure when METT-T considerations prevent mission accomplishment by section employment. The 60-mm mortar lacks the destructive power of heavy mortars and field artillery. By concentrating the section's fires, a greater measure of destructive power can be achieved. The employment of separate mortar squads lessens the destructive power achieved by consolidating the section but it does gain responsiveness to special situations. Squad employment also increases the problems associated with ammunition distribution and resupply, as well as fire control. Employment by squads can reduce the company commander's span of control problems if the mortar squads are

attached to platoons or to a patrolling element.

e. Under extreme circumstances the commander may choose to leave one of the section's mortars behind and have additional ammunition carried for the remaining mortar. This could occur during operations over deep snow, requiring the mortar section to use ahkios to transport its weapons and equipment. The 6-man mortar section can normally be expected to pull a single ahkio, which can carry up to 200 pounds. Operations on mountainous terrain may also cause the commander to choose to leave a mortar behind. During assault climbs or infiltration attacks over terrain the enemy considers impassable, it may be necessary to devote the efforts of all 6 mortarmen to getting a single mortar and its ammunition into firing position.

3-2. DISPLACEMENT

a. Based on the scheme of maneuver and the company commander's guidance, the mortar section sergeant formulates a displacement plan as part of his fire plan. The displacement plan is normally a map overlay showing initial positions, subsequent positions, routes, and pertinent control measures. The section leader briefs the section on the displacement plan. He orients the section on potential targets using a map, a compass, and prominent terrain features. When possible, after having received new information, the section leader updates the earlier orientation given to the section.

b. To support offensive operations, the displacement plan must permit rapid displacement and emplacement while ensuring availability of immediate fire support. The enemy situation, the distance and terrain to be covered, and the requirement for continuous fire support determine the displacement technique to be used. However, the mortar section most often displaces as a complete section. The section may occupy successive positions while the company continues to advance, or it may identify likely firing positions and continue to move with the company until required to fire. Continous orientation by all members of the section will reduce the time needed to bring effective fire on the enemy.

c. The defensive displacement plan has the same requirements as the offensive plan with some additions. Each member of the section should be shown the route to be used and the exact location of alternate and supplementary locations. Use of prestocked firing positions, pre-laid wire for communication, and predetermined firing data should be considered. If time permits all firing positions should be readied so the gunners can quickly lay the mortars. Careful map inspection, and coordination between the rifle company and the supporting field artillery battalion should result in accurate map location of all firing positions. Two techniques to speed the emplacement of the mortar section during defensive displacement are:

(1) The section sergeant reconnoiters subsequent firing positions and determines the desired locations of the mortar baseplates. He places a tent peg or stake into the ground at the intended location. Attached to this peg is 5 meters of engineer tape and another peg. The section sergeant runs this tape out and uses his M2 compass to orient the tape in the direction of fire. He then stakes the tape down. Depending on the time of day, when the position will be occupied, and the tactical situation, chemical lights can be placed at the far end of the tape to aid the gunner. If the lightstick holding device (combat light device, 6-inch light wand holder, chemical light, P/N 95270-90) is used, it can be adjusted to show only a slit, denying the enemy observation of the light. Upon arrival, the mortar crew emplaces the baseplate at one end of the tape, sets the mortar sight on 3200 mils, sights on the light or along the tape, refers the sight to the section's SOP deflection (normally 2800 mils), and puts out aiming stakes. With practice, the mortar crew will be able to emplace quickly during day or night.

(2) If the enemy situation permits, one mortar can be carried to the firing location and emplaced using the M2 compass. The mortar crew places out an aiming post as if the mortar were going to occupy that position at that time. A stake is then driven into the ground at the rear of the baseplate, with a portion left visible. The mortar is moved to another position 25 to 30 meters away, and the procedure is repeated. The bottom sections of the aiming posts are left in position. Both the baseplate stakes and the aiming stakes are marked by white engineer tape or chemical lights. Mask and overhead clearance are checked at each location.

d. In retrograde operations, displacement is planned to provide continuous support. Close coordination and communication with the commander are needed to ensure that the mortars move at the proper time. Because of its mobility, the mortar section is an ideal supporting weapon to maintain in firing position until the last of the rifle elements displace. The high rate of fire of the M224 allows the section to suppress enemy dismounted assault elements so friendly forces can disengage.

e. The 60-mm mortar section normally displaces as a single element. It is always ready to fire from a hasty position. Depending upon the terrain and the enemy, the commander may have the mortar section displace by alternate or successive bounds so as to provide continuous support. If displacement by bounds is used, the squads normally make short bounds. Generally the two squads do not move out of sight of each other, or do not remain out of sight for long. The section sergeant controls displacement as he continues to move with his squad. He may change from squad to squad if necessary, after orienting the in-place squad as to potential targets. The section's ability to see targets, and the availability of communications means, will effect the choice of displacement technique.

3-3. RECONNAISSANCE AND POSITION SELECTION

a. Reconnaissance for mortars is an examination of the terrain to determine its suitability for mission accomplishment. Although map, ground, and air reconnaissance can be used, the section sergeant most commonly makes a map reconnaissance. A map reconnaissance is not completely reliable since man-made terrain features may have changed or the surface conditions may not be suitable for mortar employment. Even so, a thorough map reconnaissance should help the section leader determine areas from which the section clearly cannot be employed. A detailed ground reconnaissance is the preferred method of locating positions for the mortar section, but lack of time and mobility may not allow it. The mortar section sergeant should accompany the company commander on the leader's reconnaissance.

b. The general location of the mortar section is chosen by the company commander. He makes his decision based on a careful consideration of the METT-T aspects of the situation, as well as:

(1) The need to provide maximum coverage of the company's area. This means considering both minimum and maximum ranges of each type round. The commander should consider positioning the mortar section near the center of the rifle company sector or battle position. This normally provides the best target coverage and the greatest flexibility. Based on METT-T factors, positions near the rear or flanks may be selected.

(2) The need to place the mortars in defilade. This protects the mortar section from enemy direct and low angle fires while still allowing it to support the company.

(3) The need to provide some measure of security for the mortar section. The section should be positioned near or with other elements of the company. The commander may position the mortars near the company command post, near the rearmost rifle platoon, with the company trains, or the reserve force if there is one.

(4) The need to provide for ease of ammunition resupply. The chosen position need not be directly on a route for resupply vehicles, but being near one eases the resupply problem if vehicles are used. Since the mortar ammunition is lightweight, resupply by carrying party over short distances is possible.

c. Once the company commander has designated the general location of the mortar section, the section sergeant makes a reconnaissance and determines the precise location for each squad. This selection of precise locations is made based on:

(1) Maximum coverage of the company area. This includes the traverse limits of the baseplate used.

(2) Maximum and minimum ranges of the mortar with each type of ammunition, and the bursting radius of the HE round.

(3) Defilade.

(4) Camoflage and concealment.

(5) Mask and overhead clearance.

(6) Room for dispersion between squads.

(7) Firm ground to support baseplates and permit the construction of emplacements.

(8) Routes for ammunition resupply. These should be covered and concealed.

(9) Security.

d. Once a section has occupied a position and the mortars are laid on the most likely direction of fire, the section sergeant prepares an observed firing chart. Ready ammunition is unpacked, and communications are established. While the mortars are left in temporary firing positions, permanent emplacements are built to Stage I specifications. These positions are continuously updated until they are at Stage III. Alternate and supplimental positions may be prepared extensively, or merely designated.

e. Communication with the mortar section is the key to effective employment. The single man-packed radio in the section is normally used to monitor the company command net. It may be placed on the frequency used by the platoon having priority of fire. It may be used to enter the FIST fire control net, but it does not operate routinely in that net. Wire is the primary means of communication during long halts or defensive operations. The company commander must ensure that wire is quickly laid to the mortar section, and that all platoons can pass calls for fire to the mortars. Common methods of controlling the fires of the mortar section are by voice command, by visual signal, or by messenger. Voice is the most common means of controlling the fires of the mortar section during direct alignment. Initial commands to move, or to fire, may be passed to the section over the company command net but not lengthy fire missions.

f. Advance-party operations by the light mortar section are the exception rather than the rule. The size of the section and the simplicity of the weapon make a rapid and efficient emplacement possible without an advance party. Whenever the section is expecting to move, particularly at night, and sufficient time exists to reconnoiter and prepare the new position, the section sergeant should do so. A set of direction and baseplate stakes, marked for easy identification, can help the crew in emplacement. Chemical lights of different colors may be useful, depending on the tactical situation.

3-4. TYPES OF ENGAGEMENT

The mortar section must constantly be prepared to engage targets using fire with or without an FDC. Fire with an FDC maximizes the effectiveness of the mortar section. The section sergeant establishes and operates an FDC whenever the mortar section occupies semi-permanent positions or makes a lengthy halt. The FDC can influence the outcome of the battle by massing mortar fires, by furnishing prearranged fires during reduced visibility, by shifting fires, by effecting time on target missions, by completely lifting fires, or by furnishing fire support to other units within range. Fire with an FDC may not always be possible or desireable. The mortar section can still be effective without using an FDC if the members are trained in the methods of fire without one.

a. During World War II and the Korean War, 60-mm mortars were often employed effectively using the direct-lay and the direct-alignment methods--that is, without an FDC. Each method has advantages, but also disadvantages that limit its effectiveness and efficiency.

(1) The direct-lay method requires the gunner to see his target. The crew must be well forward where it is exposed to enemy small arms fire and subject to being overrun by enemy forces.

(2) The direct-alignment method requires that the FO know the location of the mortars at all times and that he remain within 100 meters of the gun-target line. This restricts the movement of the FO and it may require frequent displacement of the mortars.

c. The direct-lay and direct-alignment methods are used when the tactical situation precludes the employment of the mortars from a semipermanent location. These two methods of fire have certain advantages, and mortar crews must be prepared to use the best one for the situation.

(1) Unless the mortar section is already laid and firing data has been predetermined by an FDC, both the direct-lay and direct-alignment methods enable the mortar section to engage targets more quickly then the FDC method.

(2) Direct-lay has the additional advantage of being very accurate at short ranges. The gunner sees the effect of his fire and makes corrections immediatly.

(3) Both methods improve the responsiveness of the mortar section when the company is conducting an infiltration, movement to contact, hasty attack, or air assault.

d. The direct-lay method is controlled by either the section sergeant or the squad leader against targets that can be seen from the gunner's position. The M224 mortar can be used in either the conventional (bipod mounted) mode or the hand-held mode. If the range to the target is more then 1,300 meters, the bipod must be used. Bringing the section into action using the hand-held mode is faster than the bipod mode when using direct lay.

(1) When using the hand-held mode, the ammunition bearer automatically removes three of the M204 horseshoe charges from the M720 HE round. This reduces the charge to only one increment, making it safe for firing in the hand-held mode. The section SOP may establish that a certain amount of ready ammunition be carried preconfigured to charge 1. The unused increments can be placed into an empty fiber ammunition cannister and safely stored for reattachment. Section SOP should also state the fuze setting to be set on this ready ammunition. An IMP setting generally provides the easiest rounds to adjust, but proximity (PRX) or near-surface burst (NSB) settings usually are the most effective for immediate suppression of enemy fire. The section sergeant estimates the target range, adds any required safety factor, and

ensures that the gunner has the proper target identified. He then announces the estimated range. The gunner checks the range indicator and says whether charge 0 or charge 1 is required. The section leader then issues an abbreviated fire command, designating which gun, the type of ammunition, the fuze setting, and the number of rounds to be fired for effect. If the section sergeant desires a non-SOP fuze setting, or a special combination of settings, he directs the ammunition bearer to set it by including that information in the fire command. The gunner sets the mortar for trigger fire, positions the mortar, and fires after the ammunition bearer has loaded the round and is clear of the muzzle. The section leader senses the impact of the round, calculates the necessary range correction, and reissues the fire command. The gunner is responsible for deflection corrections. The section sergeant can either have both the mortars fire independently, or he can direct that only one mortar engage the target, depending on the enemy situation and the amount of ammunition available.

(2) When using the conventional mode there is no need for the ammunition bearer to automatically remove the three propellent charges since charges 0 through 4 can be fired from the bipod. The section sergeant still estimates the range, but he uses the graphical firing scale or the firing tables to determine the charge and elevation settings. The gunner ensures that the sight unit is set on 3200 mils deflection, and that the vertical cross hair is aligned on the target. The fire mission continues as in the hand-held mode except that the gunner uses the burst-on-target method of deflection correction.

e. The direct-alignment method allows the mortar section to occupy defilade positions while the section sergeant (or squad leader) assumes the functions of FO. He must place himself on or near the gun-target line to do so. The M224 mortar can be used in direct alignment in either the conventional mode or hand-held mode. A variation of the direct-alignment method set forth in FM

23-36 (TEST) is for the mortar squad to set out an arbitrary single reference stake to the left front of the gun and index a deflection (from the SOP) on the M64 sight unit while aligning the tube in the general direction of the target. This variation eliminates the use of the T-bar but may result in greater deflection corrections.

f. When a call for fire is received during movement and the target cannot be engaged by either the direct-lay or direct-alignment method, a hip shoot is initiated. A hip shoot is a hasty occupation of a firing position and requires both an FDC and an FO. The section sergeant normally acts as the FDC. The FO's corrections may be sent over the section radio or by a hastily laid wire net. The section sergeant must quickly determine an azimuth of fire by map inspection. He then gives this direction to the mortar squads. The second squad leader uses the M2 compass to lay the base mortar. The section sergeant uses either the MBC ,the graphical firing scale, or the firing tables to determine the appropriate elevation and charge. He uses either the MBC or the M19 plotting board to refine the firing data based on the FO's corrections. The section sergeant may use the aiming-point deflection method, depending upon the terrain. The second mortar is laid either by sight-to-sight, or M2 compass.

g. Training programs should encompass both methods. Only through proper and continuous training will mortar crews obtain and retain a high level of proficiency. Even though light infantry units routinly employ the mortar without an FDC, they must not disregard the FDC method of employment. The section sergeant should cross-train the other squad leader and the gunners in FDC procedures, and he should establish and employ an FDC when possible.

CHAPTER 4

SUPPORT DURING OFFENSIVE OPERATIONS

4-1. SUPPORT AND COMMAND RELATIONSHIPS

a. The mortar section is capable of firing in support of any of the company's rifle platoons. The company commander must establish his priorities of fire and command relationships. Priorities for the 60-mm mortar section are established by designating priority of fires and priority targets. Command relationships are limited to either retaining the mortar section under the company commander's control or attaching squads to the rifle platoons. The company commander may attach one mortar squad to a platoon while keeping the other mortar squad under his control--for example, when an element is sent out on a combat patrol.

b. The mortar section is the only indirect fire support element that can accompany the rifle platoons as they move to the objective and begin the assault. The general mission of the section is the same as for the battalion mortars. The planning considerations outlined in FM 7-90 apply to the 60-mm mortar section sergeant's planning. The amount and type of ammunition available are usually the first considerations in the use of the light mortar in the attack. The controlled supply rate (CSR) of rounds per mortar each day should not be exceeded except in an emergency. When the CSR is small (10 to 20) missions should be limited to those which can be observed, and can immediatly affect friendly troops and operations. When the CSR is larger (20 to 100) missions may include those that affect planned operations as well as those that involve fires without adjustment. Intense operations against a strong enemy force may generate a required supply rate (RSR) of 100 to 300 rounds.

c. The section sergeant and company commander must consider how much ammunition the unit should carry and who will carry it. The mortar section can carry only a limited amount of ammunition. Every effort must be made to keep the individual loads of the mortarmen to a minimum. Every extra pound of personal equipment decreases the firepower of the section. In World War II 60-mm mortar squads, the gunner carried the mortar and six rounds. The other two members of the squad carried 12 rounds each. This represents only 1 minute of fire at the maximum rate for the M224 mortar. Any additional equipment required by the mission will reduce the amount of ammunition that the section can carrry. The company commander's options for carrying additional mortar rounds are somewhat limited:

(1) Each member of the rifle platoons and company headquarters can carry additional mortar rounds. This adds weight to the already heavy load of the riflemen and the machine gunners, but it does ensure that mortar ammunition is always available. This method is difficult to control if enemy opposition is intermittent. During a deliberate attack, this method can be most effective. As the rifle platoons pass through or near the proposed mortar firing position, they can drop their mortar rounds there. A modification of this method was used in the Korean War when attacks were being made along or up steep ridgelines. The lead rifle platoons did not carry any mortar rounds. The mortar section moved second in the line of march, carrying about 60 rounds. The second and third rifle platoons, moving behind the mortars, carried one or two rounds per man. When enemy contact was made, the lead platoon immediately began the assault, supported by the mortar section firing the ammunition it carried. As each succeeding rifle platoon continued past the mortar position, it dropped its mortar rounds and continued the attack.

(2) The rifle company can have the mortar section carry

as much ammunition as possible and rely on vehicles, aircraft, or battalion carrying parties to resupply ammunition. This method works best when the advance is along a road net or over trafficable terrain. Organic vehicles may be used, or captured enemy equipment may be pressed into service. A technique which will save time and effort is to have mortar ammunition broken out of its wooden boxes either at the ammunition transfer point or the unit trains. The individual cannisters can then be placed into color-coded aviator kit bags and stockpiled for movement forward by whatever transportation means are available. Using the kit bag makes it easier to load, unload, and transfer the ammunition. About 15 rounds can be carried in each kit bag, making a load which can be handled easily by two men, and by one man in an emergency. In some areas of the world labor service units provided by our allies may carry ammunition. In the lesser developed countries, there may indigenous pack animals available. If carrying parties or pack animals are used, the company executive officer and first sergeant must coordinate to ensure that guides and drivers/handlers are available and supervised.

d. Light infantry company offensive operations are characterized by dismounted movement, often over rugged terrain, and rapidly changing situations. These operations require flexibility on the part of the mortar section. The section sergeant must plan to conduct fires en route to the objective, on the objective, and beyond the objective. The value of the 60-mm mortar section in the offense does not lie in its volume of fire or its continuous fire support. The mortar section's greatest contribution to combat success is its immediate responsiveness to the company commander's orders, the speed at which it can be brought into action, and the effectiveness and accuracy of its multioption fuze-equipped rounds. The limited ammunition available to the section and the limited destructive power of each round make it necessary to consider when and at what the mortar should be fired. The company mortar section should be used to engage targets that appear suddenly and cannot be immediately engaged by other indirect fire support. Once effective battalion mortar or field artillery fire is brought on the enemy, the company mortar section should normally cease fire to conserve ammunition. The commander must decide if the application of additional fire is necessary to destroy or neutralize the enemy. If so, he may direct the company mortar section to continue fire.

e. The lightweight M8 baseplate is used most often during offensive operations. The mortar bipod and sight unit may be used. The bipod and sight make direct alignment more reliable. In the attack or movement to contact, the larger M7 baseplate may be left at the trains location and brought forward later. The smaller M8 baseplate is lighter by 11 pounds, which allows the crew to carry three more rounds per mortar. If a mortar squad is attached to a unit conducting a combat patrol, the squad leader may choose to carry only the mortar cannon and the M8 baseplate. This is the lightest combination possible, weighing only 18 pounds. The mortar is then fired using the direct-lay, hand-held mode.

f. The mortar section normally moves as a section within the company formation. The likelihood of enemy contact will determine whether the commander chooses the traveling, traveling overwatch, or bounding overwatch technique of movement.

(1) When the company is moving using the traveling or traveling overwatch technique the mortar section normally moves either directly behind the company command group or directly behind the second rifle platoon. The section sergeant monitors the company command radio net and continually orients the section members to the terrain. At halts, he moves forward to coordinate with the company commander and the FIST chief.

(2) If the company is moving in bounding overwatch, the mortar section is normally positioned directly behind the command group, and it moves with that element. The section sergeant

continously estimates the range to the lead elements of the bounding platoon and he is prepared either to provide fire support from his location, or to move to a better position. The company commander may attach one mortar squad to each of the two lead rifle platoons to assist them in overwatch.

g. Maintaining orientation is even more important for the mortar section moving during limited visibility. The mortar section lacks night vision devices, and it must rely on natural light or luminous markers to keep track of the element ahead. During limited visibility, the company commander may move with the lead platoon. If so, the mortar section moves behind the last squad of that platoon rather than with the commander. During short halts, the mortar section spreads out in prone positions behind cover. During longer halts, the mortars are set up, and a limited amount of ammunition is readied. A specified amount of illumination ammunition (determined by unit SOP) may be carried ready-to-use. Fire without an FDC is much more difficult at night. Direct-lay using the hand held mode is normally the most effective method.

4-2. MOVEMENT TO CONTACT

a. The displacement method chosen during a movement to contact depends on the company commander's evaluation of the likelihood of enemy contact, the distance to be traveled, and the terrain being traversed. Normally, the mortars move as a section. If enemy contact is imminent, the section sergeant may direct the squads to displace by alternate bounds. Although this provides a mortar in position to fire at all times, it is slow and difficult to control. It works best in terrain with good visibility and trafficability. If the terrain does not allow good observation, it is best to keep the section together or to attach the squads to the lead rifle platoons.

b. The comander may choose to attach one of the mortar squads to the lead platoon. This allows quick response to enemy contact by the lead element, but it hampers the massing of fires by the section. If the company is acting as the advance guard and has a dedicated battery in direct support, the mortar section is normally kept under the control of the company commander. The section sergeant monitors the company command net and ensures that the section is in range of anticipated targets. The mortar section can supplement the fires of the dedicated battery by covering additional priority targets as they become visible. In the movement to contact, the light mortars are most effective firing HE and WP for suppression, or WP for screening and obscuration.

c. Although the mortar section can carry only a limited amount of ammunition during a movement to contact, this disadvantage is offset by its ability to bring immediate fire on the enemy. During World War II, the mortar section was found to be most effective in the movement to contact if it followed close behind the lead elements, opened fire quickly, had effective first rounds, and fired only three or four rounds per target. If the enemy is offering only intermittent resistance, the section is best used by attaching a mortar squad to each of the two forward platoons. This uses the quick response of the mortars to its fullest. If there is greater resistance, the mortars should be kept under the company commander's control and moved 75 to 100 meters behind the lead platoons. This provides quick response while making concentration of fire easier.

d. Communication between the lead platoon (which can see targets) and the mortar section is the most critical requirement of the mortar fire support system. There are several effective techniques that have been used in combat to facilitate such communications:

(1) The mortar section can monitor the radio frequency of the lead platoon. If enemy resistance is encountered, the mortars immediately stop and conduct a hip shoot, firing the adjusting round well forward of the friendly lead elements. This requires close monitoring of the lead platoon's location by the section sergeant who acts as the FDC. The platoon sends corrections to the mortars by radio. This technique is best used when the company commander expects the enemy resistance to be significant. The mortar section is protected from the initial enemy fires by remaining slightly to the rear, while it is still close enough to bring fire to bear quickly.

(2) The section sergeant can either carry a roll of wire and telephone himself, or have a soldier designated to move with the mortar section, carrying a wire dispenser. When enemy resistance is encountered, the mortars are emplaced and the wire is connected to a telephone at the mortar position. The section sergeant (and wireman, if used) moves to a position where he can observe the enemy and adjust fires, unrolling the wire as he moves. Assault wire (MX-6894 or MX-6895 combat assault rolls) can be used since fast installation and light weight are important. Assault wire is thinner and not as strong as WD-1, but the 800-meter MX-6894 weighs only 4 pounds as contrasted to 25 pounds for the same length of WD-1 wire on the MX-306. Standard WD-1 field wire can be used either on the MX306 doughnut roll or the CE-11. However, these are heavy, and the wire should be recovered.

(3) The mortar section can move behind the company command group until the lead element makes contact with the enemy. The section sergeant can then lead the section forward to a position where they can fire using either direct alignment or direct lay. The company commander can direct the section sergeant by voice command, hand and arm signals, radio, or messenger.

4-3. HASTY ATTACK

a. In the hasty attack, the commander develops the situation and uses rapid maneuver to maintain momentum. The targets engaged by the mortar section are primarily targets of opportunity, although the commander attempts to preplan targets when possible. The mortar section is normally kept under the control of the company commander, not attached to the rifle platoons. The section sergeant must use judgment and initiative in the absence of orders to determine how best to support the company maneuver. The section must be employed aggressively to support the assault elements as they close with the enemy.

b. Once the objective has been seized, the mortar section must be brought forward immediately to a position from which to support the entire company. It must immediately prepare to fire against an enemy counterattack. The section sergeant must act decisively, using his best military judgment and initiative to accomplish the commander's intent. The mortar section plays a key role in the defense against a counterattack. During the period after the seizure of the objective and before the assault force has reorganized, consolidated, and planned other fires, the company mortars represent the most effective fire support means available. The section sergeant must displace the section forward to support the company, establish fire control and communications, compute data and prepare to fire the section final protective fires (FPF), evaluate existing ammunition stocks, redistribute ammunition, coordinate resupply requests, and ensure that his squads prepare hasty defensive positions. He must do this with a minimum of guidance from the company commander.

4-4. DELIBERATE ATTACK

a. The deliberate attack is characterized by detailed planning, both for maneuver elements and for fires. The commander uses the light mortar section to supplement scheduled fires by heavier indirect fire weapons. The flexibility of the light mortar makes it best suited for use against targets of opportunity encountered during the attack and for immediate screening missions. Light mortars can be included in the preparation fires if ammunition, positioning, and the enemy situation permit. The commander must keep in mind that mortar ammunition fired now may be hard to resupply later. The FIST chief may advise the commander that fires on the initial objective to support the final assault should be provided by mortars only, especially if the direct-support artillery is 155-mm. This allows indirect fire suppression of the enemy until the assaulting forces close to within about 50 meters (minimum safe distance). The infantry forces can get closer to the enemy under the cover of small caliber indirect fire than would be possible with fires from medium or heavy artillery. A technique which was used successfully in World War II was for the assaulting platoon to approach as close as possible to the objective while the mortars fired HE to suppress the enemy. On a prearranged signal by the assault force, the mortars would switch to WP rounds and fire several in quick succession. The bursting WP rounds were the signal to the rifle platoon that the mortars were shifting their fires 50 to 100 meters beyond the objective. As soon as the last WP round burst the assault forces would close with the enemy. Not only did the WP rounds signal the shifting of fires, but their smaller casualty producing radius provided a margin of safety for the assault force. The psychological effect of the WP, and the smoke produced, combine to create confusion among the enemy during those critical moments when the friendly forces are exposed. This requires well-trained and practiced mortar crews, as well as close coordination between the mortar section and the assaulting force.

b. During a deliberate attack against a fortified position, the mortar section is best employed with the company's support element. Although 60-mm HE fires will not penetrate a properly constructed fortification with overhead cover, they will force the enemy to remain inside his positions, limiting his observation. They will inflict casualties on troops in open trenches. By firing WP the mortar section can obscure enemy observation from adjacent positions and assist the assault element in gaining a foothold. After the assault element has made an entry into the fortified position, the mortar section may move forward with the support element. Follow-on elements from the company can be used to carry mortar ammunition as they move forward and through the support position.

c. During MOUT operations, the light mortar section is normally employed with the company's support element. The section provides the rifle platoons the firepower and obscuration needed to isolate a building or strongpoint while assault and security elements move forward to gain the initial foothold.

d. The 60-mm mortar can be effective against enemy positions on urbanized terrain. Its high rate of fire and short minimum range allow the mortar section to mass fire on specific enemy positions in the restricted confines of city fighting. The mortar section can be used to attack targets behind buildings that may otherwise be impervious to low-angle artillery fire. The section can be used to obscure, neutralize, suppress, or illuminate targets. The multioption fuze increases the mortar round's effectiveness but the HE round, even employing the delay (DLY) fuze setting, can penetrate only the upper floors of light buildings.

CHAPTER 5

SUPPORT DURING DEFENSIVE OPERATIONS

5-1. FIRE PLANNING

a. The 60-mm mortar section provides the company commander organic indirect fire support that must be integrated into the unit's overall defensive fire plan to be effective.

b. The mortar section is used to engage:

(1) Dismounted enemy infantry, especially when it is covered from direct fire or concealed.

(2) Enemy armored vehicles, using HE rounds with PRX fuze setting. This causes the crew to button up, reducing the effectiveness of the vehicle while separating it from any accompanying dismounted infantry.

(3) Enemy long-range direct-fire weapons that are supporting his attack. The section normally engages these using a mixture of WP and HE rounds to suppress and screen.

(4) Assaulting enemy forces, using final protective fires.

(5) Enemy mortars, especially light and medium mortars, with a combination of PRX and NSB fuze settings.

(6) Enemy forces attempting to breach friendly wire or mine obstacles.

c. The mortar section can fire current illumination rounds to about 950 meters. The small size and limited burn time of the 60-mm illumination round make it more suitable for point, rather than area, illumination.

d. The M302A1 WP round has a maximum range of about 1,600 meters. Its primary use during the defense is to screen enemy observation and fire. It can also be used to mark targets for air strikes, and it has a limited incendiary and casualty producing effect.

5-2. FIRE SUPPORT DURING THE DEFENSE

a. The company mortar section is normally employed as a section during defensive operations with priority of fires to a designated rifle platoon. The mortar section is normally assigned a single FPF, which is integrated into the company's defensive fire plan to augment the fires of heavier weapons.

b. The light mortar section is emplaced in a defilade position, normally near the company command post. It may co-locate with the company reserve, or the rearmost rifle platoon. Wire communications are established through the company command post with each rifle platoon and the observation posts. The section's second telephone may be connected to a wire line laid to the platoon having the priority of fires. This provides for alternate communications if the primary wire is cut by artillery fire. Positions are dug in and overhead cover is provided for both the ammunition and crew. Positions are camoflaged and wire lines are buried.

c. The section sergeant acts as the FDC and closely coordinates with the FIST chief and the company commander to ensure effective integration of the section's fires. The section sergeant locates and, if time permits, prepares an observation post where he can control the fires of the section himself if wire communication is lost. He monitors the company command radio net,

and may change to a platoon frequency or the FIST frequency depending on the company commander's guidance.

d. The mortar section's fires are not normally included in the defender's counterpreparation fires. Battalion mortars and field artillery should be used for this role. The company mortar section can be used, however, to engage targets of opportunity, especially at night, or targets in close-in defilade positions. The light mortar section is used to fire as an immediate response to enemy direct-fire weapons or against enemy mortars firing from positions near friendly lines. It is better to engage small enemy probes, breach teams, or reconnaissance patrols, with indirect fire from the mortar section than to disclose the locations of friendly machinegun, SAW, or rifle positions.

e. Once the enemy attacks, the company mortar section fires to break up his formations and destroy his forces. Enemy elements assaulting the friendly positions, and enemy crew-served weapons locations are primary targets. Fires from the 60-mm mortar are particularly effective against enemy forces that have closed with friendly elements. The mortar section can engage these targets by using NSB and PRX fuze settings if friendly forces have overhead cover, or by using an impact (IMP) fuze setting otherwise. If necessary, 60-mm mortar fires with PRX fuze settings can be directed onto dug-in friendly positions. This type mortar fire is effective against enemy infantry outside the friendly element's bunker while not harming personnel inside a well-constructed bunker with overhead cover. The mortar section, firing from the reserve platoon's position, can be used to support a counterattack or to limit the enemy penetration.

f. If the rifle company is counterattacking, the mortar section is normally employed by section, supporting by fire from preplanned positions.

g. The 60-mm mortar section can fire an FPF that is 70 meters responsible for passing all target lists, overlays, and FPF information to the relieving section. Ammunition prestocked in a defensive location is normally transferred to the relieving section. Baseplates and aiming stakes may be transferred, especially if the section being relieved has well prepared defensive positions. The relieving mortar section's base gun can be laid parallel with the guns of the relieved section by sight-to-sight reciprocal lay. Wire lines should be transferred to the relieving section.

b. The mortar section may be required to continue to fire the missions associated with normal battlefield activity during the relief in place. If so, the two section sergeants should coordinate to ensure a smooth transition of responsibility. The section sergeant of the relieved section should conduct a daylight reconnaissance of the route back to the company assembly area, as well as of the section's location in the assembly area.

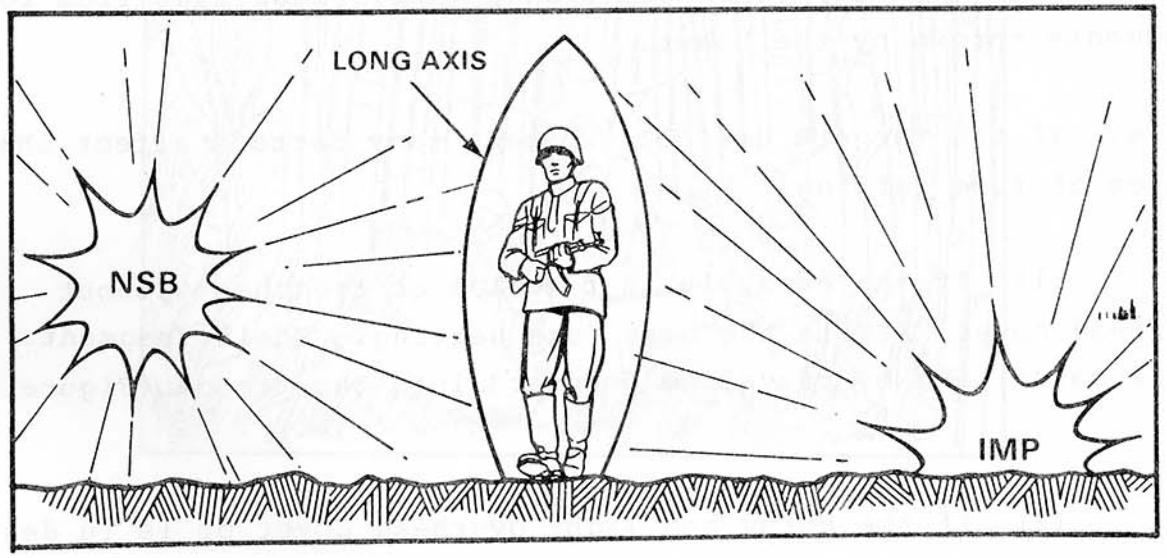
CHAPTER 6

OPERATIONAL AND TRAINING TECHNIQUES

6-1. HIGH-EXPLOSIVE AMMUNITION

a. The M720 HE round has four fuze settings. For the 60-mm mortar to be most effective, to have the best target effect, the section sergeant must choose the proper fuze setting. The round is most effective when the paths of the shell fragments are traveling perpendicular to the long axis of the target.

b. Exposed enemy troops that are standing up are best engaged with impact or near-surface-burst settings. The round explodes on or near the ground, and shell fragments travel outward perpendicular to standing targets (Figure 6-1). If the exposed troops are prone, the proximity setting is most effective since the fragments coming downward are once again traveling perpendicular to the long axis of the targets.



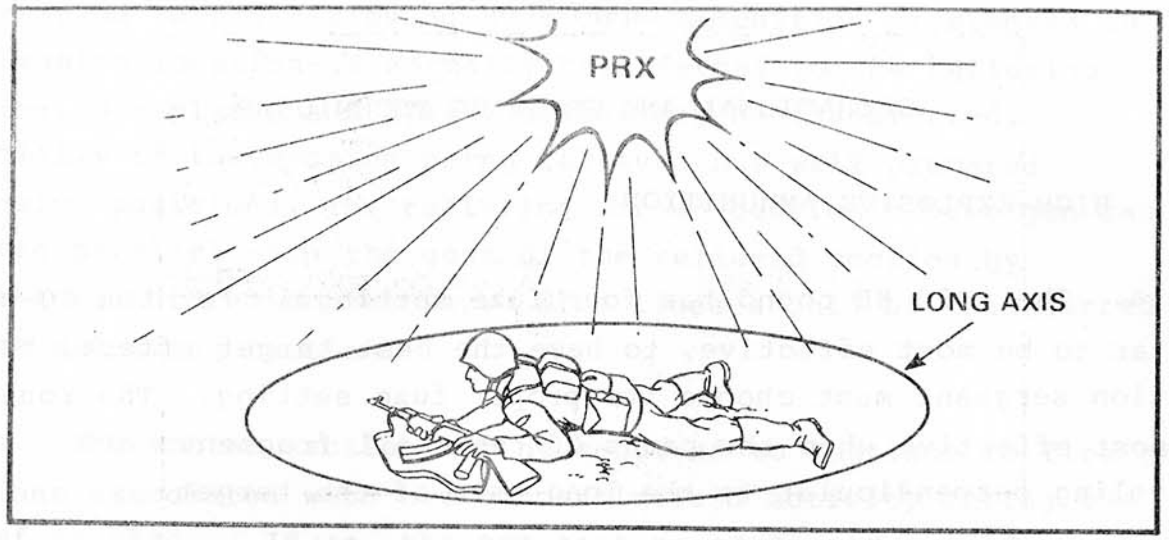


Figure 6-1. Fuze selection.

c. If the terrain around the enemy is covered by deep snow or is marshy, rounds with IMP settings may be smothered and ineffective. The NSB setting will have better target effect.

d. If the terrain around the enemy is hard and rocky, use the IMP setting. This may cause additional enemy casualties from rock fragments thrown by the blast.

e. If the targets are not exposed, many factors affect the choice of fuze setting.

(1) If the enemy is in foxholes or trenches without overhead cover, PRX is the best fuze setting. Shell fragments cause casualties by traveling downward into the trench (Figure 6-2).

(2) If the enemy has light overhead cover or is in dense foliage (such as triple canopy jungle), the delay setting is the most effective. The time delay allows the round to penetrate the light cover or dense foliage to reach the enemy before it explodes (Figure 6-3).

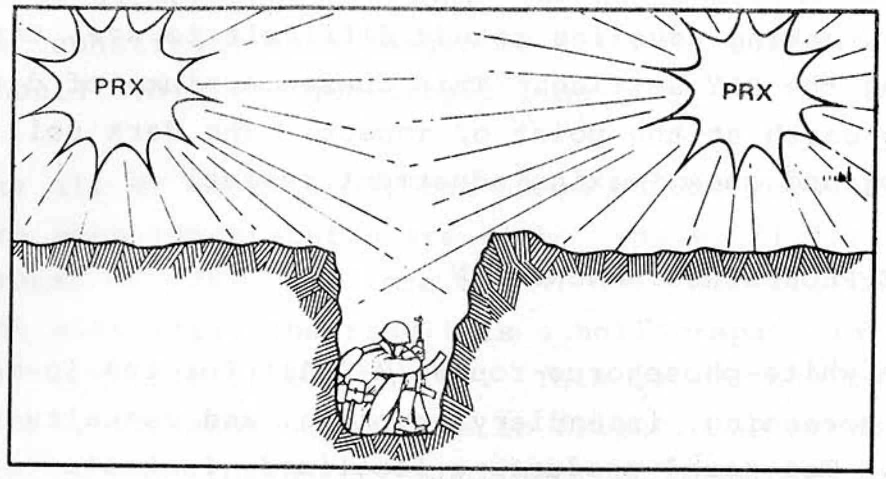


Figure 6-2. Use of PRX fuze setting.

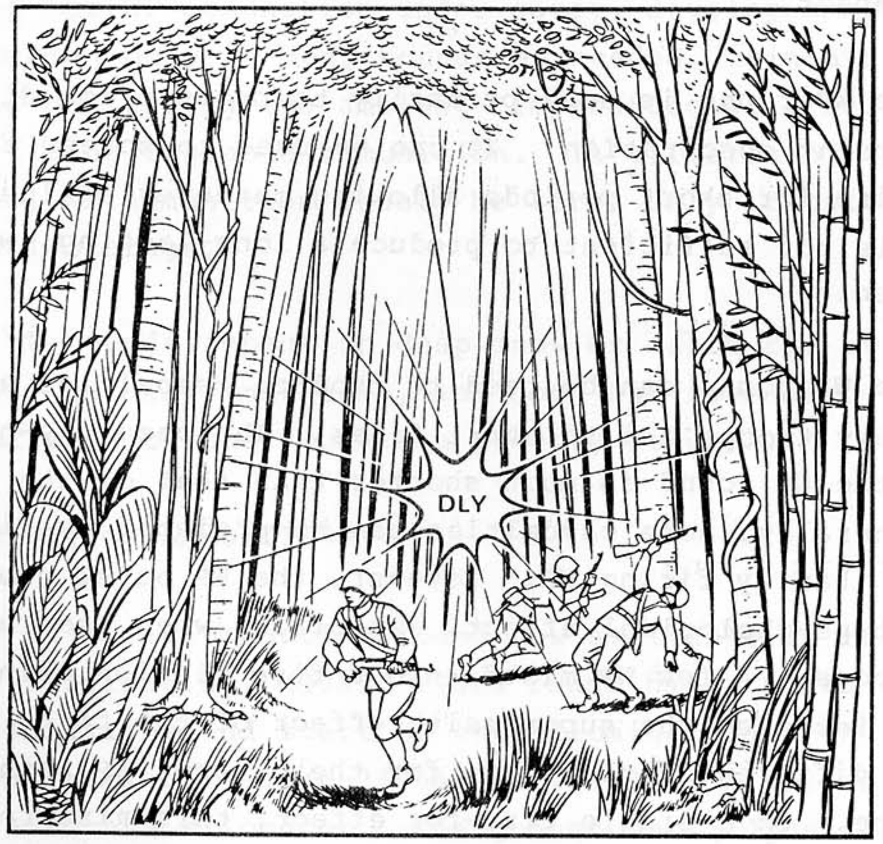


Figure 6-3. Use of DLY fuze setting.

f. The IMP setting is normally the most effective for adjusting rounds. If dense foliage prevents observation of the

IMP-fuzed round, NSB or PRX settings will cause the round to explode near the top of the trees where the burst can be better observed. If there is a combination of snow cover and fog in the target area, making adusting rounds difficult to see, try to adjust using the DLY setting. This causes a plume of dirt or exposes the earth at the point of impact. The dark soil contrasts with the fog and snow, making adustment easier.

6-2. WHITE-PHOSPHORUS AMMUNITION

a. The white-phosphorus round (M302A1) for the 60-mm mortar provides a screening, incendiary, marking, and casualty-producing capability. The round produces a localized, instantaneous smoke cloud by scattering burning WP particles up to 10 meters from the point of impact.

b. The WP round is used primarily to produce immediate, close-in, point obscuration. It can be used to screen the enemy's field of fire for short periods allowing maneuver against him. The round is not sufficient to produce a long-lasting, wide-area smoke screen.

c. The WP round can be used to produce casualties among exposed enemy troops and to start fires. The casualty-producing radius of the WP round is much shorter than that of the M720 HE round. Generally, more casualties can be produced by firing HE ammunition than by firing WP. However, the WP burst causes a significant psychological effect, especially when used against exposed troops. A few WP mixed into a fire mission mainly of HE rounds may increase the suppressive effect of the fire. The need to compute different firing data for the current WP round is a disadvantage. On a single fire-for effect, this mixture is best achieved by firing HE with one mortar and WP with the other. Once the WP are fired, the second mortar can switch back to HE if more rounds are required.

d. The WP round can be used to mark targets, especially for attack by aircraft. This is useful during the initial phases of air assault or airborne operations. The 60-mm mortar section's fires do not constitute much danger to friendly aircraft, but the aircraft should avoid the gun-target line.

e. Like all WP ammunition, the 60-mm M302A1 round needs special care when temperatures are high. The WP filler liquifies at temperatures of 100° F. Since the WP does not fill all the space in the cartridge, the result is a hollow space in the upper part of the cartridge filler cavity. This causes the round to be unbalanced and, therefore, unstable in flight. WP ammunition should be protected from direct sunlight, if possible. When stored at high temperatures, it should be stacked with the fuze up. Keeping the WP ammunition under cover, digging ammunition bunkers, opening only as many rounds as needed, maintaining proper storage, and monitoring the ambient temperature will reduce the chances of firing unstable ammunition. In climates of very high temperatures, WP ammunition should be fired only if taken directly from vertical storage.

f. If WP rounds impact on deep snow or marsh the burning particles are quickly smothered, and both the incendiary and smoke producing effects of the round are greatly reduced.

6-3. ILLUMINATION AMMUNITION

a. The 60-mm illumination round now available is the cartridge, illuminating, M83A3. This round has a fixed time of delay between firing and start of the illumination. The illumination lasts for about 25 seconds, and it provides moderate light over a square kilometer. The gunner must adjust the elevation to achieve height-of-burst changes for this round. The best results are achieved with practice. The maximum range of the illumination round is 950 meters. This range as well as the minimum range of 725 meters must be taken into account when planning illumination support.

b. The 60-mm illumination round does not provide the same degree of illumination as do the rounds of the heavier mortars and field artillery. However, it is sufficient for local, point illumination. The small size of the round can be an advantage where illumination is desired in an area but adjacent friendly forces do not want to be seen. The 60-mm illumination round can be used without degrading the night vision devices of adjacent units.

c. The differences in elevation and range of the M720 HE round and the M83A3 illumination round make coordinated illumination missions with single squads difficult. The best results are obtained by illuminating with one mortar and firing for effect with the other. If necessary, both mortars can quickly shift to fire for effect after adjusting under illumination.

d. Two or more mortars can fire illumination rounds at the same time if more illumination is needed. Two rounds fired from separate mortars allow better observation than two rounds fired in sequence from the same mortar and bursting near the same spot.

e. The rate of fire for continous illumination is one round every 10 seconds. This provides one round bursting, one halfway down, and one just burning out. A rate of one round every 25 seconds provides for one flare burning out just as the new one bursts. Continuous illumination requires alot of ammunition, and it is better provided by heavier mortars or artillery.

f. Following are three special illumination techniques that mortar units have effectively used in the past:

(1) An illumination round fired extremely high over a general area will not always alert an enemy force that it is being observed. However, it will provide enough illumination to

optimize the use of image intensification (starlight) scopes such as the AN/TVS-5 and the AN/TVS-4.

(2) An illumination round fired to burn on the ground will prevent observation beyond the flare into the shadow. This is one method of countering enemy use of image intensification devices. A friendly force could move behind the flare with greater security.

(3) An illumination round fired to burn on the ground can be used to mark targets during day or night. Illumination rounds have an advantage over WP as target markers during high winds. The smoke cloud from a WP round will quickly be blown downwind. The smoke from the burning illumination round will continue to originate from the same point, regardless of the wind.

6-4. FIRE FOR EFFECT

a. Fire for effect is used to destroy a target or to accomplish a desired tactical result. First, adjust mortar fire for deflection and range. Then start fire for effect at the center of the selected bracket. In the creeping method of adjustment, fire for effect when the adjustment is satisfactory. The observer combines fire for adjustment with fire for effect.

b. The section sergeant must determine the number of rounds to be fired for effect according to the size and composition of the target, and the ammunition available. More rounds are needed to neutralize troops and weapons in foxholes than are needed against troops and weapons in the open. If ammunition is limited, it is generally more effective to limit the number of missions fired rather than to limit the number of rounds per mission.

c. The 60-mm mortar is normally used against definitely located point targets or small area targets such as crew-served weapons and small groups of enemy troops, particularly those in defilade. Three rounds, fired from a single mortar at the same elevation and deflection, will completely cover an area about 40 meters wide by 40 meters deep with casualty-producing fragments. When more then three rounds are fired for effect on a point target, such as in final protective fire, the area covered by fragments is about 50 meters wide by 50 meters deep. This results from the natural dispersion and bursting radius of the rounds. The gunner checks the lay of the mortar for elevation and deflection during fire for effect. If the center of impact of the rounds fired for effect is not on or near the target, he may repeat fire for effect with slight corrections made for deflection or range.

d. The 60-mm mortar may be used against targets that extend laterally or in depth, by traversing fire or searching fire. Areas to be covered by 60-mm mortar fire are often limited by the traverse of the weapon (M8 baseplate) or the inability of the weapon to neutralize large areas without using large amounts of ammunition. When enough ammunition is available, small area targets can be covered effectively with the 60-mm mortar. A single mortar, firing four rounds well distributed in width or depth, covers a target about 100 meters wide or deep with casualty-producing fragments. An area target 75 meters wide by 75 meters deep can be covered by a single mortar firing a series of searching and traversing fires. A section of mortars, mounted parallel with 30 meters between them and firing four rounds per mortar well distributed, can effectively cover an area 225 meters wide and 50 meters deep. This section can cover an area target about 225 meters wide by 75 meters deep by executing a series of traversing and searching fires. Targets of this size require a large amount of ammunition. The decision to fire such a mission should be made by the section sergeant only after careful consideration of the tactical need and the ammunition supply.

6-5. HAND-HELD MODE

a. When the 60-mm mortar is used in the hand-held mode, it becomes a direct-fire weapon and is normally fired at short ranges. As a direct-fire weapon, no special method of adjusting fire is required. If the first round of fire is not effective, the gunner slightly changes the deflection or range to bring the next burst nearer the target. Fire for effect is always three to five rounds of fixed fire, depending on the target. The normal crew for the hand-held mortar is two men--the gunner and the assistant gunner; however, it can be employed by one man.

b. The crew should try to fire from partial defilade. This gives some protection from enemy direct fire while still allowing the gunner to engage the target by the direct-lay method. The gunner may assume either the sitting or the kneeling position. He aligns the mortar for direction by sighting over the top of the barrel. The elevation at which the mortar is held must be determined based on the estimated target range using the range indicator scale on the mortar carrying handle. The mortar is elevated or depressed to correct the range for each succeeding round.

c. If the first round is not on target, the gunner corrects for deflection or range by moving the barrel left or right and by lowering or elevating the barrel. To increase range, he must depress the barrel. Definite movements must be made in correcting the fire of the hand-held mortar. The gunner's normal tendency is to ease the barrel in the direction of the correction. Because of this tendency, he often fails to make a large enough correction. This must be overcome by training.

d. When a partial defilade position cannot be used and enemy fire prevents the crew from firing from the open, the hand-held mortar can be fired as an indirect-fire weapon. This procedure is difficult to do, it requires practice, and it is less accurate than the direct-lay method. The gunner, taking the sitting position, is directed by an observer in laying the mortar in the direction of the target. He uses the observer's estimate of the range. The observer uses informal voice commands or hand-and-arm signals to direct the gunner to move the mortar barrel left or right, or to change range. The gunner should make bold movements of the barrel for the initial adjustments on a target to eliminate a close type of adjustment.

e. As an example of the use of the hand-held mortar, assume that a hand-held mortar squad is accompanying the lead platoon of the company during a movement to contact. An enemy machine gun opens fire and stops the advance. The mortar squad leader is able to determine the general location of the enemy.

(1) The gunner immediately unslings the mortar, closes the auxiliary carrying handle, and assumes the sitting position in partial defilade. The squad leader estimates the range to the enemy to be 300 meters. Since he knows that charge zero (0) covers ranges from 70 meters to 400 meters, he announces the charge to the ammunition bearer who prepares it. He also tells him whether or not he wants a specific fuze setting on the adjusting round. Normally, the IMP setting is used. The gunner ensures that the selector switch is in the trigger-fire mode and announces READY. The ammunition bearer checks the round and places it in the barrel. Upon releasing the round, he immediately withdraws his hand, keeping clear of the muzzle until the weapon fires. The gunner aligns the center of the mortar barrel on the target, lowers or elevates until the floating ball in the range indicator steadies on the 300-meter mark, and squeezes the trigger. While waiting for the round to burst, the ammunition bearer places another round in the barrel, and prepares at least three more for the fire-for-effect phase. The squad leader may choose to have a different fuze setting on the fire-for-effect rounds, depending on the target. If he does not say anything, the

ammunition bearer uses the IMP setting.

(2) The first round bursts about 50 meters beyond the target and about 10 mils to the right. The gunner moves the barrel slightly to the left, steadies the floating ball on the 250-meter mark, and fires again. The gunner does not try to bracket the target at such a close range. He estimates the range over or short of the target, makes the correction, and fires again.

(3) The second round is on target, and the gunner fires the remaining rounds at the same direction and elevation to destroy the enemy.

(4) After the gunner fires the last fire-for-effect round, the ammunition bearer prepares another. The gunner does not fire this round but keeps the mortar trained on the target, ready to fire if the squad leader directs REPEAT. If ordered to repeat, he fires additional rounds at the previously determined direction and elevation. The exact number of rounds fired at a target may be more then three, depending on the amount of ammunition available. Usually, lesser amounts are ineffective. If the last round is not fired, the ammunition bearer returns it to a fiber cannister for use later.

6-6. RATES OF FIRE

a. The 60-mm mortar section is capable of firing large amounts of ammunition very quickly. The mortar can be fired for 4 minutes at a sustained rate of 30 rounds per minute. A three-man crew can have 15 to 20 rounds in the air before the first round impacts. The high rate of fire is due to a combination of the simplicity of the mortar and its lightweight ammunition. The cooling fins at the base of the mortar allow this high rate of fire to be maintained for long periods.

b. In the past, mortar crews trying to produce and maintain a high rate of fire have used the two-man loading method. This involves the gunner concentrating on target alignment and maintaining proper elevation while both remaining crew members, located on opposite sides of the mortar, alternate dropping rounds into the tube. While this method may produce a high rate of fire, it significantly increases the chances of double loading the mortar and causing an in-bore premature detonation. The two-man loading method should not be used. The tactical requirement for extremely high rates of fire must be compared with the possibility of serious injuries or fatalities among the mortar crew, which outweigh the benefits. A single loader can fire almost as fast with less chance of double loading. Normally, the maximum rate of fire cannot be maintained for long, given the limited amount of mortar ammunition carried by the company. If a high rate of fire is required and ammunition is available, the squad leader can assist the ammo bearer in preparing rounds. The two of them can establish a smooth flow of rounds with practice.

6-7. RANGE ESTIMATION

a. The section sergeant, squad leader, and gunner estimate range to the target by eye. They must be prepared and trained to do so even though devices and materials such as lightweight laser range finders and highly accurate maps and aerial photographs may be available.

b. The purpose of range estimation training is to teach the soldier how to estimate ranges by eye with minimal error. In combat, ranges are usually estimated by eye; therefore, all section members should be trained in this method. The emphasis should be on estimating ranges between 200 and 1,500 meters. Visual estimation by untrained men results in an average error of at least 20 percent of the range. A definite system of range estimation, practiced often, is the only way to make estimation by eye reliable.

c. The football-field method is the easiest way to teach soldiers range estimation. In this method, the soldier estimates the range by mentally applying to it an easily visualized unit of measure (a football field) (Figure 6-4). Familiarity with the 100-meter unit and how it appears on different types of terrain and at different distances enables the estimator to apply it with some accuracy. Application of the unit of measure beyond 500 meters is difficult. To estimate ranges over 500 meters, select a point halfway to the target, apply the 100-meter unit up to this halfway point, and double the result.

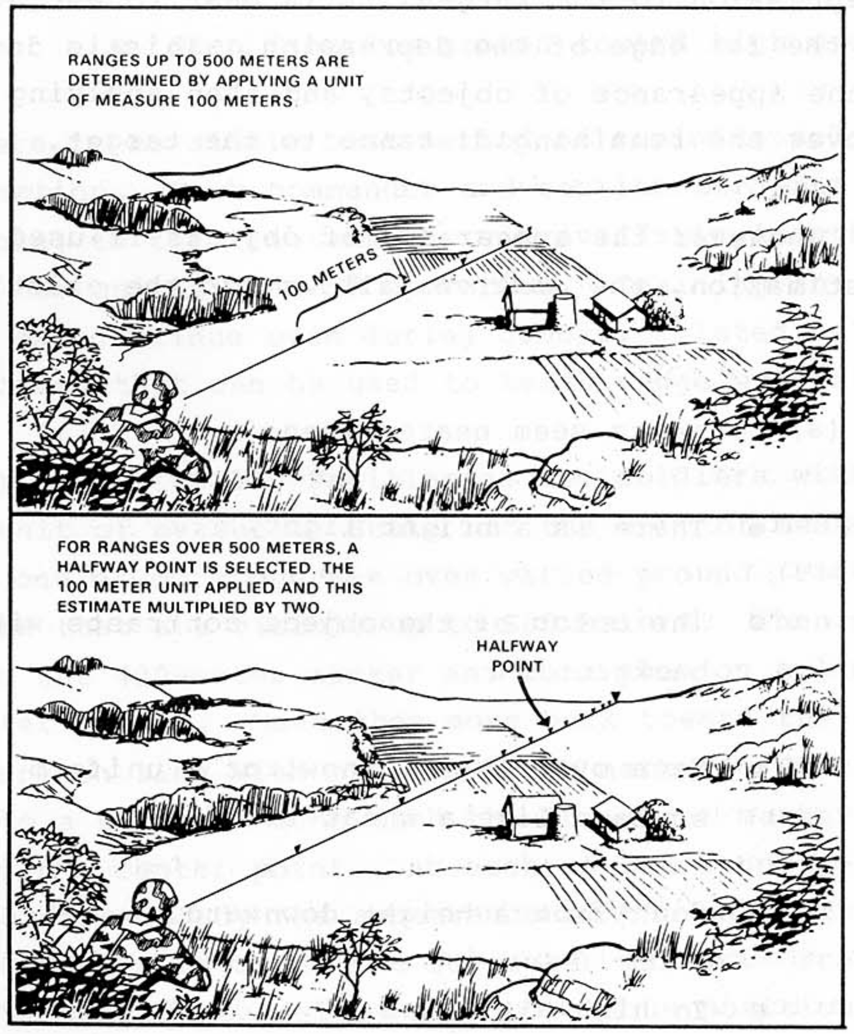

RANGES UP TO 500 METERS ARE DETERMINED BY APPLYING A UNIT OF MEASURE 100 METERS.
100 METERS
FOR RANGES OVER 500 METERS, A HALFWAY POINT IS SELECTED. THE 100 METER UNIT APPLIED AND THIS ESTIMATE MULTIPLIED BY TWO.
HALFWAY POINT

Figure 6-4. Range estimation by application of the unit of measure.

d. Light and terrain conditions affect the appearance of objects by making them seem closer or farther away than they really are. The effect of these conditions on the appearance of objects within the first 100 meters is small.

(1) In some cases, much of the ground between the observer and the target is hidden from view, and the application of the unit of measure to the hidden portion is impossible. Sometimes the appearance of objects is the only guide. If there is a considerable stretch of visible ground extending from the far edge of a depression to the target, it is best to estimate the distance to the far edge of the depression. This is done by judging by the appearance of objects, and then applying the unit of measure over the remaining distance to the target.

(2) Whenever the appearance of objects is used as a basis for range estimation, the observer allows for the existing conditions.

(a) Objects seem nearer when:

- There is a bright light.
- The color of the object contrasts with the background.
- Seen over water, snow, or a uniform surface like a wheat field.
- Seen from a height downward.
- In high altitudes.
- Seen over a depression, most of which is hidden.

- Seen down a straight road or railroad.

(b) Objects seem more distant when:

- Seen over a depression, most of which is visible.
- There is fog or poor light.
- Only a small part of the object can be seen.
- Seen from low ground toward high ground.

e. There is no single best method of training soldiers in range estimation. Each commander and section sergeant must adapt their training to the time and terrain available and the expected terrain in the unit's area of operation. Training in range estimation can continue even during combat. Listed below are three exercises that can be used to teach range estimation.

(1) Exercise 1: Familiarize the soldiers with the 100-meter unit of measure. Stake out the unit of measure (100 meters) on one or more courses over varied ground (Figure 6-5) with markers that are visible up to 500 meters. Then conduct the soldiers to the 400-meter marker and form them on a line facing the 500-meter marker. Have them move back toward the center point until all are on line with the 300-meter marker. Successively move them to a point on line with the 200-meter marker, 100-meter marker, and the center point. At each of the stopping points, have the soldiers study the appearance of the unit of measure and apply it successively up to the 500-meter marker. Practice this exercise at each of several ranges in various positions. Divide the unit receiving instruction into two or more groups, each practicing on the several courses. Repeat as often as necessary.

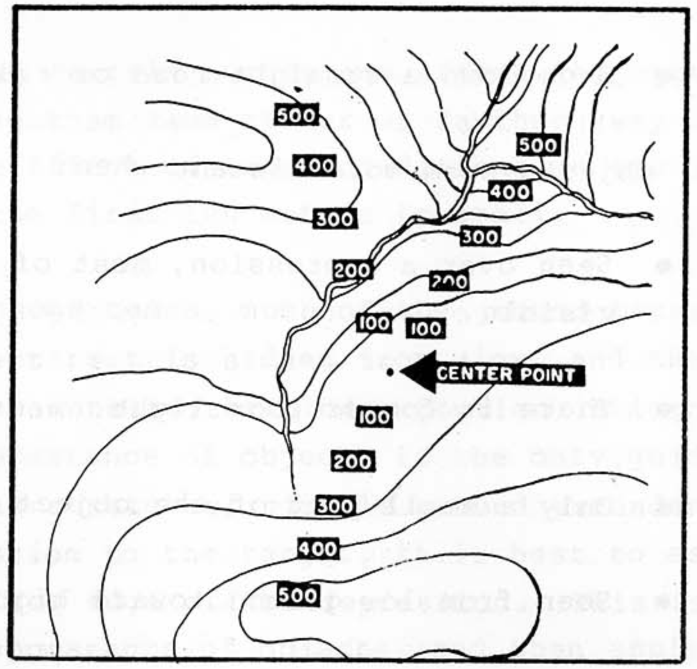


Figure 6-5. Range estimation layout.

(2) Exercise 2: Demonstrate the application of the 100-meter unit of measure. Mark a 1,000-meter range every 100 meters by large markers or target frames, each marker bearing a number. Keep the markers from view. Direct the soldiers undergoing the training to apply the 100-meter unit of measure along a straight line to a target in the general direction of the markers. When they have estimated the distance to the final point, signal a soldier stationed at the first target marker to walk along the line and raise them. Check the estimations of the successive 100-meter points and the final point against the markers. To obtain accuracy, repeat the exercises and vary the ranges. This allows the soldiers to imprint in their minds what the 100-meter unit of measure looks like over varied terrain.

(3) Exercise 3: Give the soldiers practice in range estimation. From a central point, measure ranges to various objects within 1,000 meters. Then conduct the group undergoing the training to the central point. Have the men estimate the ranges to the various objects as they are pointed out. Have the soldiers write down their estimates, allowing a few seconds for each estimate. When all ranges have been estimated, announce the true ranges. Have the soldiers compare their estimates. Repeat the exercise over different terrain. This gives practical exercise of the skills learned in the previous two exercises.

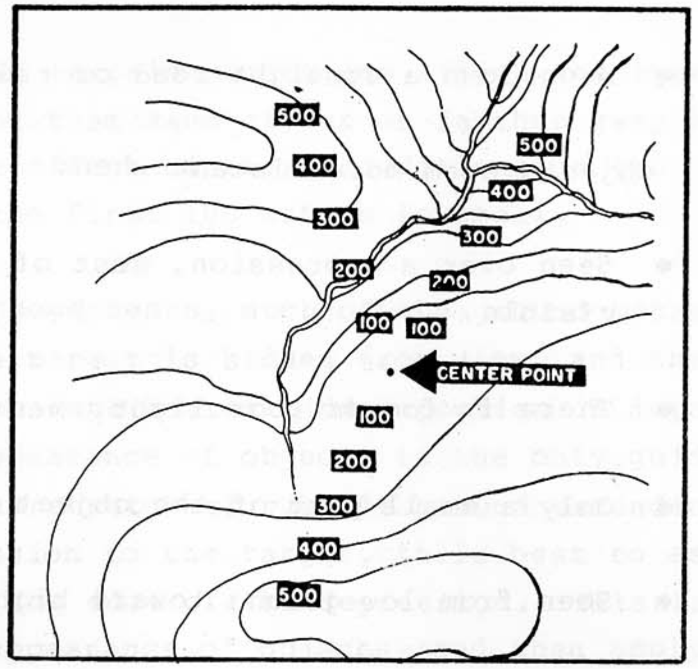
6-8. FORWARD OBSERVATION

a. Following are the procedures used by the 60-mm mortar section sergeant or squad leader when acting as the section's forward observer and employing the direct alignment technique.

b. To deliver accurate and effective fire on targets, the observer must be near the firing position. A suitable observation point is the main factor in selecting a mortar position; hence, the OP is selected first. The observer must keep the mortar close to, or at least within 100 meters of the OP where his control of the mortar is easiest. When the observer must move to a new OP to observe his assigned sector, the mortar must be displaced also to a position near the newly selected OP. If the new OP is more than 100 meters from the mortar position, the mortar should be moved closer. When the terrain or the situation prevents moving the mortar to within 100 meters of the OP, the observer should try to place the mortar so that the OP is within 100 meters of the gun-target line. If this cannot be done, the observer must use the target-grid method or try to visualize the gun-target line, and make necessary adjustments with respect to it.

c. Spotting, a mental process, is the determination by the observer of the location of a burst with respect to the target. The observer's spotting determines his next correction. When the burst appears, the observer immediately makes his spotting, except when taking advantage of drifting smoke. He bases his spotting on what he sees at the moment of the burst, not after it has occurred. When spottings are made on drifting dust or smoke, the observer must consider the wind direction.

(1) Range spotting. A burst that is beyond the target from the observer is spotted OVER for range; one that is between



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(1) Range spotting. A burst that is beyond the target from the observer is spotted OVER for range; one that is between

the target and the observer is spotted SHORT for range (Figure 6-6). A round that hits the target is spotted as TARGET, and one that is at the correct range, but slightly off the observer-target (OT) line, is spotted CORRECT. Range is spotted DOUBTFUL when no positive spotting is obtained. (When a round is spotted doubtful for range, the observer tries to get a positive spotting by moving the next burst to the OT line; this is done by giving a deflection correction with no change in range.) A positive spotting is made from any round that can be definitely located for both range and deviation.

(2) Deviation spottings. Rounds are spotted for deviation as right, left, or line. The observer spots all errors in deflection by measuring in mils the deviation of each burst from the OT line. The mil scale in the binoculars may be used for this purpose. A burst to the right (left) of the OT line is spotted (so many mils) right (left). When instruments are not available, angles are measured by the hand and fingers held a known distance from the eye (Figure 6-7). The angle subtended by each is determined by the soldier before he goes into the field.

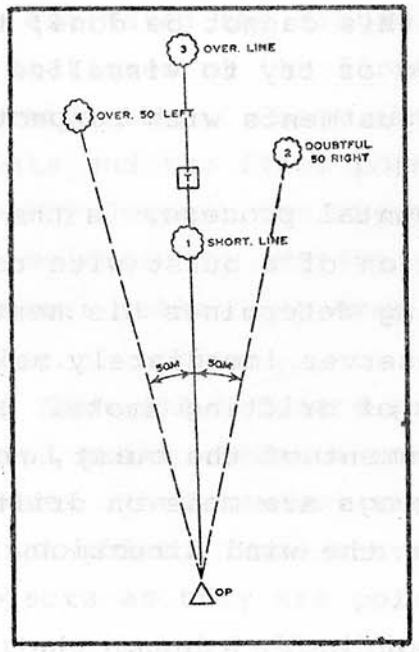

Figure 6-6. Spotting.

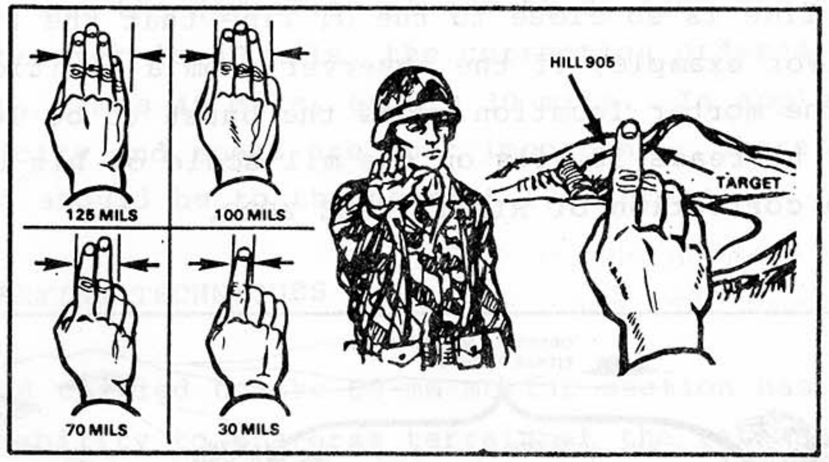

Figure 6-7. Measuring mil angles with the hand.

(3) Lost. A round not seen by the observer is spotted LOST.

(4) Unobserved. A round that is not observed but is known to have impacted (usually heard) is reported as UNOBSERVED.

(5) Unobserved over (short). A round that is not observed but is known to have impacted over or short of the target is reported as UNOBSERVED, OVER (SHORT). This spotting may be made when the observer has accurate knowledge of the terrain.

d. The observer's best location for rapid adjustment is at the mortar position. His deviation spotting and the deflection correction to be placed on the sight are then numerically equal. The tactical employment of the mortar, however, may make it necessary for the observer to be separated from the mortar. Nevertheless, the mortar should be placed within 100 meters of the OP, whenever possible. If the observer takes a position in front, in rear, or to one side of the mortar but within 100 meters of it (Figure 6-8), the errors in deflection can be measured from the target to the burst by means of the mil scale in the binoculars and applied directly to the mortar. This can be done because the gun-target line is so close to the OT line that the two are almost the same. For example, if the observer from a position within 100 meters of the mortar location spots the burst to be left of the target, and he reads 30 mils on the mil scale of his binoculars, he orders a correction of RIGHT THREE ZERO.

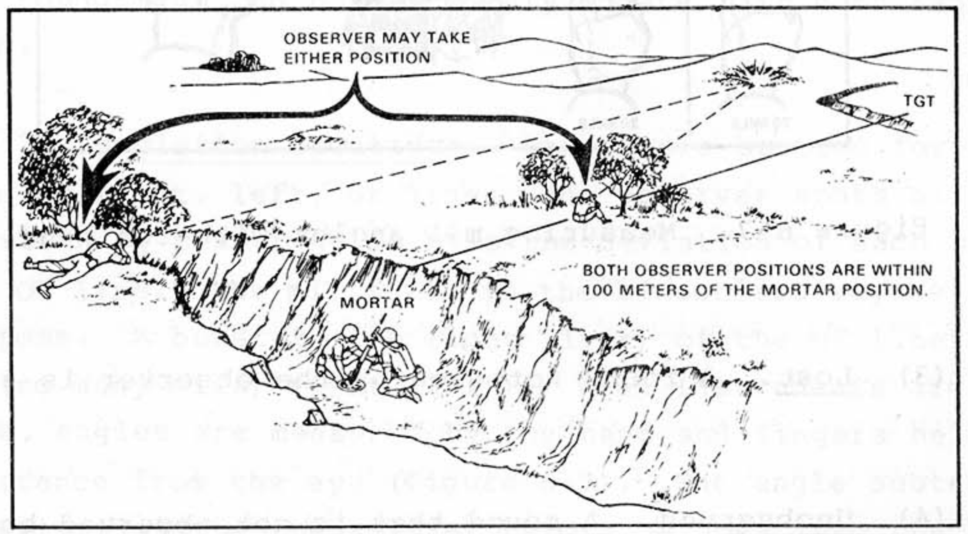
OBSERVER MAY TAKE
EITHER POSITION
TGT
BOTH OBSERVER POSITIONS ARE WITHIN
100 METERS OF THE MORTAR POSITION.
MORTAR

Figure 6-8. Observer within 100 meters of the mortar location.

e. When the mortar cannot be moved to within 100 meters of the OP, it should be placed so that the OP is within 100 meters of the gun-target line. Then the gun-target line and the OT line are almost the same. However, the deviation that the observer reads will not be the same as the deflection to be set on the mortar sight. If the observer is in front of the mortar, the deviation spotting will be greater than the deflection to be set on the mortar sight. If the observer is to the rear of the mortar the deviation spotting will be smaller than the deflection to be set on the sight. Since different distances give different ratios, it is necessary to apply a correction factor to the number of mils spotted before ordering a deflection change. This factor is a fraction with the OT distance over the gun-target distance. For example, if the OT distance is 600 meters, the gun-target distance is 800 meters, and the deviation of the burst from the target as read by the observer is 40 mils, the correction ordered is 600 divided by 800, times 40 mils, equals 30 mils. In applying this factor, simplicity and speed are most important. Therefore, distances used should be to the nearest 100 meters.

6-9. LOAD-CARRYING TECHNIQUES

a. The load carried by the 60-mm mortar section has a direct effect on its ability to traverse terrain at the rate needed to move with other elements of the rifle company. Since the mortar section is most effective when it is close to the point of enemy contact (although not under direct fire), it is important for the company commander and the section sergeant to monitor the section's load and keep it at the minimum required for the mission and tactical situation. Section members should carry only their minimum combat load in order to carry the mortar and ammunition as well. If transportation for the section's existence load is not available, the amount of ammunition, as well as the firepower of the section, is reduced.

b. The M224 mortar can be broken down into its component parts and hand carried. This, plus the flexibility inherent in the choice of baseplates, allows the section sergeant to tailor the section's load to a specific mission and specific terrain.

(1) If the company is conducting an administrative road march, the section sergeant should request or coordinate to have the mortars and ammunition moved either by battalion or company vehicles. This will conserve the strength of the section members, allow members to carry their entire existence load, and provide the maximum protection to the ammunition, which can be kept in its packing boxes. The mortar section should move in the march column near the vehicle carrying the mortars. Care must be taken in

transporting the mortars to ensure that nothing is lost or damaged, especially the sights. A section member may be detailed to ride with the mortars to ensure their safety, and to make sure that the mortars are delivered to the correct location.

(2) If the company is conducting a tactical road march or if vehicular transport is not available, the mortars should be carried using the three-man carry. The section sergeant and squad leader carry the radio, telephones, aiming stakes, sight units, boresight, MBC, and plotting boards. They relieve the gunner and assistant gunner of their loads from time to time, allowing them to rest. The gunner carries the cannon and bipod. The mount is attached to the cannon at the lower saddle, and the elevating mechanism is fully depressed. The bipod legs are together, and the bipod is folded under the cannon until the elevating mechanism latches to the collar assembly. The cable is wrapped around the legs and cannon, and it is hooked onto itself with the snaphook. The ammunition bearer carries the M7 and the M8 baseplates. Ammunition can either be carried on battalion vehicles or distributed among the other crew members. To ease the strain, these loads should be rotated often among the squad members.

(3) If the company is conducting a movement to contact, the M7 baseplate can be left with the company or battalion trains. The M8 baseplate is used with the bipod and M64 sight unit. The gunner carries the sight and cannon with the M8 baseplate. The baseplate is locked into its carrying position. The ammunition bearer carries the bipod and the ready ammunition. World War II and Korean War experiences with the three man M19 mortar-equipped squad showed that it could carry the mortar and a maximum of 30 rounds. This load was added to the bare essentials (combat load) carried by the mortarman. If the mortar section has to carry individual existence loads also, the amount of ammunition it can carry is greatly reduced. The combination of M8 baseplate and bipod is not the lightest possible one with the M224 mortar, but it allows the greatest flexibility with reduced weight. If

necessary, the mortar can be fired in the hand-held mode immediately, or the bipod can be quickly attached and the mortar used in the direct-alignment or indirect-fire modes. The M8 baseplate does not allow 6400 mil fire, but the crew can compensate for this by careful choice of mortar location and direction of fire from the initial position.

(4) When the mortar crew is accompanying a unit on patrol or is performing an airborne or air assault insertion, it normally carries only the cannon with the M8 baseplate attached. This is the lightest combination possible (18 pounds) allowing the easiest portability. It requires that the mortar be employed in the direct-fire mode. The section/squad leader, gunner, and ammunition bearer rotate the load among them while moving.

6-10. LOAD-CARRYING DEVICES

a. There are four pieces of standard Army equipment that may be used to help the mortar section members transport the weapon and ammunition.

(1) The combat field pack, either the large or medium size (Figure 6-9), can be used with or without the metal pack frame. Either pack allows the soldier to carry his existence load and additional ammunition. The 60-mm mortar rounds can be carried either inside the pack or in the outside pockets. Individual rounds should be kept in their cylindrical packing container to protect both fuze and propellent charges from exposure and possible damage. Use of the pack frame and field pack (Figure 6-10) allows the greatest flexibility in load carrying.

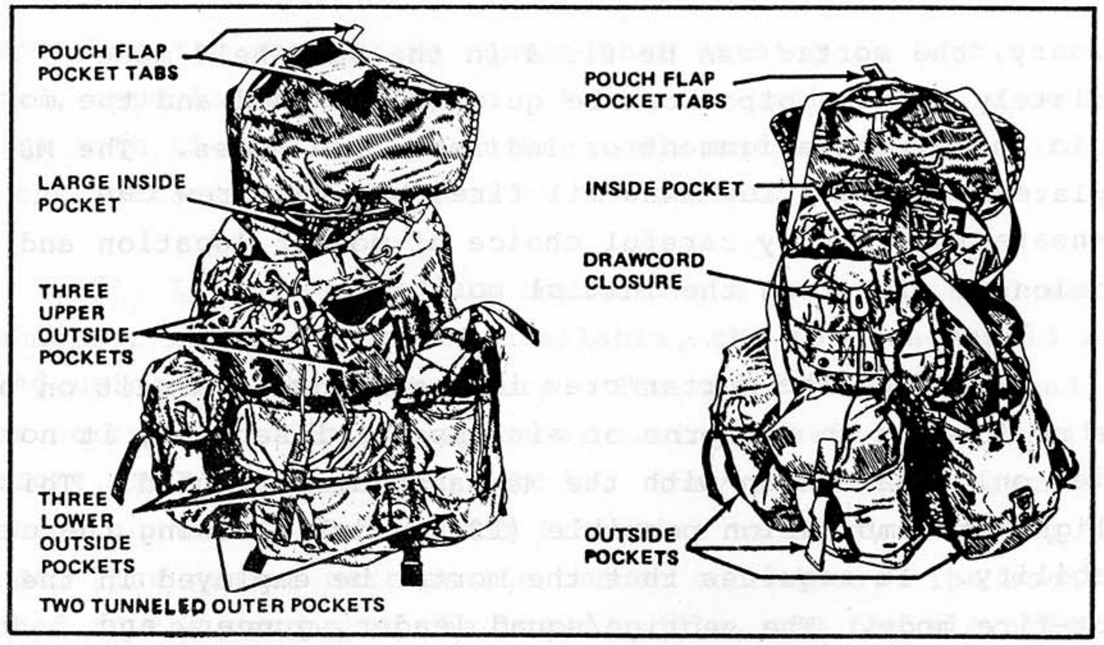

Figure 6-9. Large and medium combat field packs.

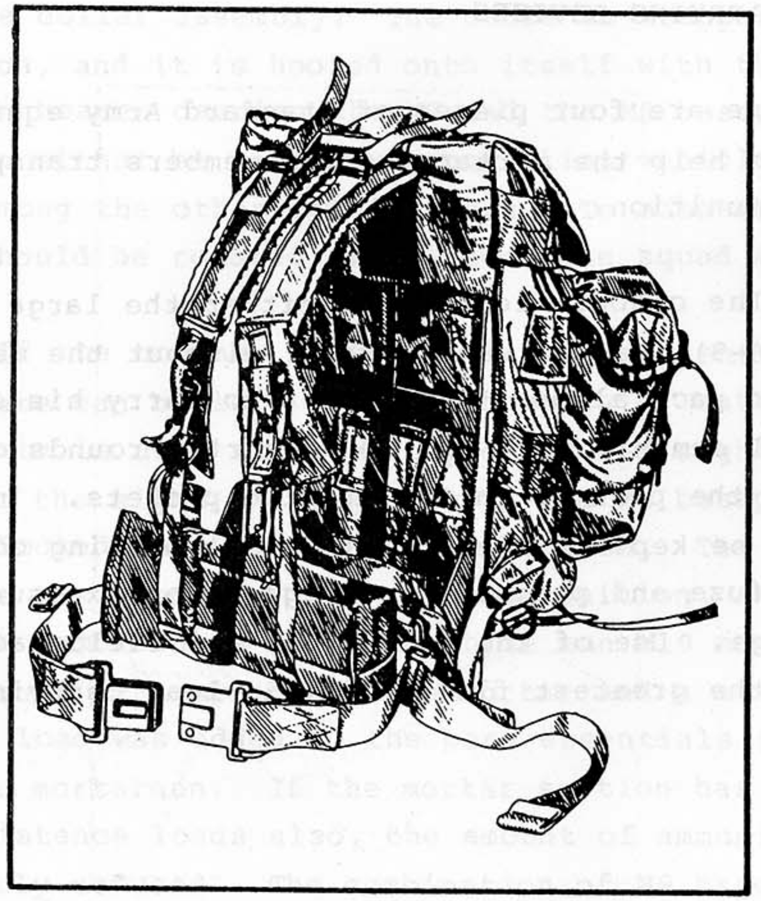

Figure 6-10. Medium combat pack attached to pack frame.

(2) The pack frame can be used to carry heavy or bulky loads without the field pack by the attachment of the cargo shelf (Figure 6-11). The cargo shelf is attached to the pack frame by hooking it to either the middle or the bottom brace of the frame. Cargo tie-down straps are used to secure the load to the pack frame (Figure 6-12). The tie-down strap should be wrapped horizonally around the load and the pack frame with the flat-hook end of the tie-down strap placed into the slot at the buckle and the loose end pulled to tighten. Some slack should be left in the strap. The fastener is pushed into the closed position, which takes up the slack and tightens the strap around the cargo. Not only can mortar ammunition be carried in this manner, but the mortar bipod, baseplates, and sight units can also be secured to the frame by tie-down straps. To open the fastener, pull on the end of the strap.

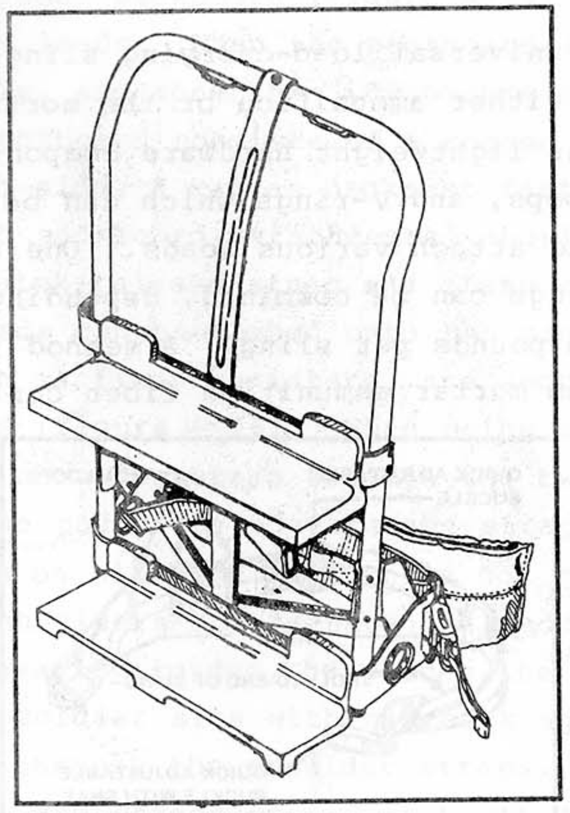

Figure 6-11. Attachment of the cargo shelf.

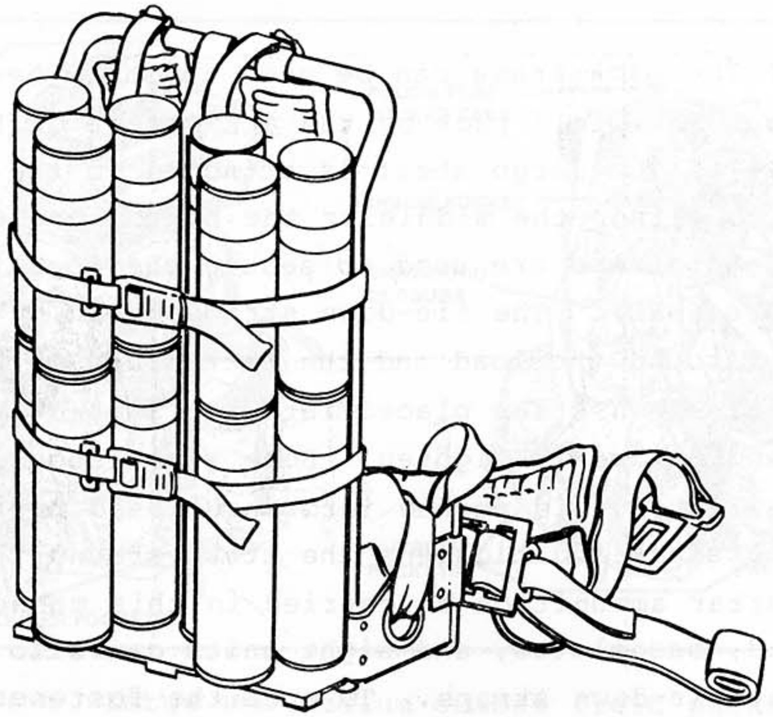

Figure 6-12. Cargo tie-down straps.

(3) The universal load-carrying sling (Figure 6-13) can be used to carry either ammunition or the mortar. The sling is adjustable and has lightweight hardware components such as buckles, slide loops, and V-rings which can be shifted to the position needed to attach various loads. One sling can be used alone, or two slings can be combined, depending on the load. Do not carry over 35 pounds per sling. A method for using the sling to carry the 60-mm mortar ammunition fiber containers is shown in Figure 6-14.

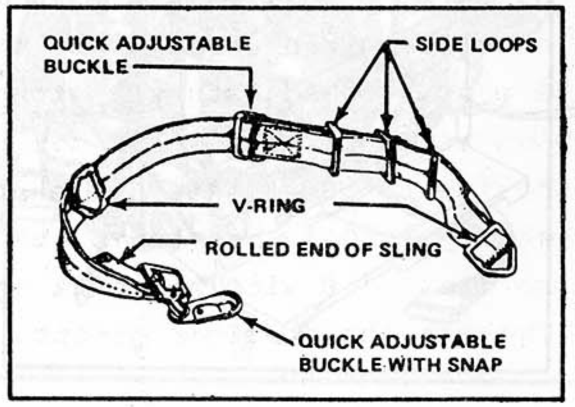

Figure 6-13. Universal load-carrying sling.

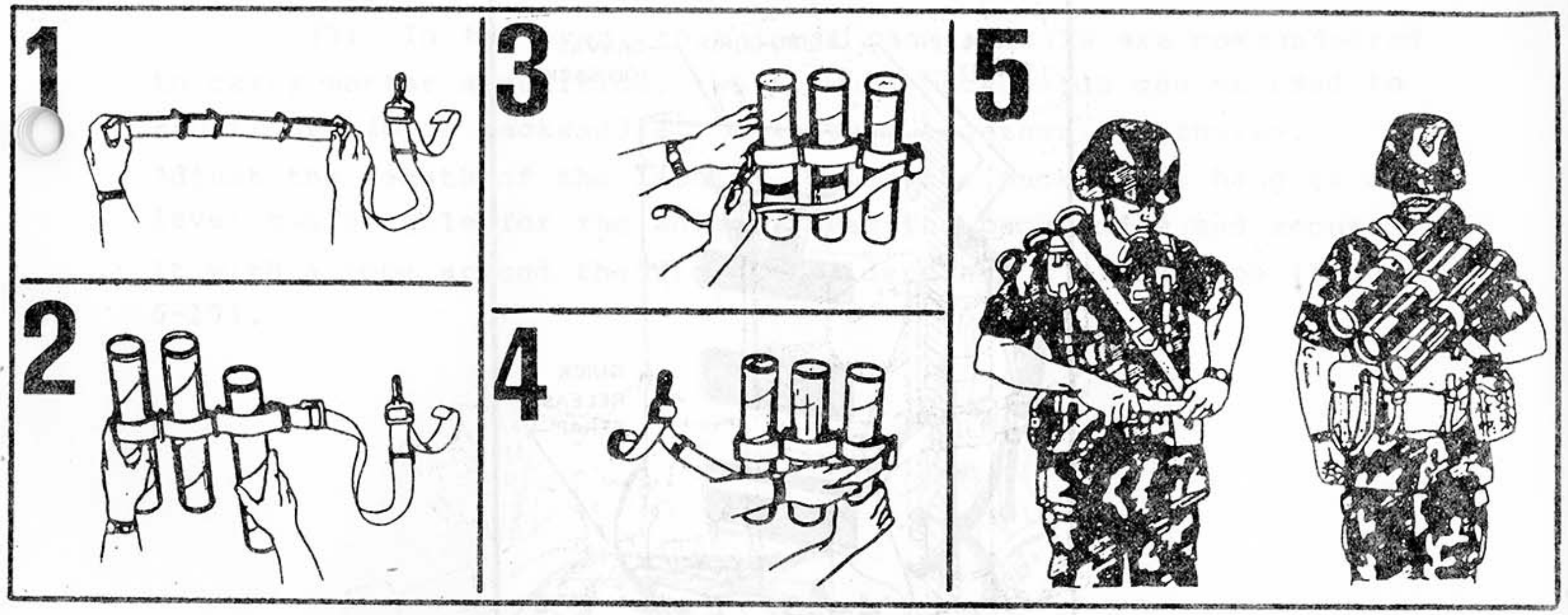

Figure 6-14. Carrying fiber ammunition containers.

(4) The plywood packboard (Figure 6-15) is an efficient means to carry heavy loads. When the packboard is used, 50 pounds can be carried easily, and more then 100 pounds can be transported. The packboard consists of a rugged frame of molded plywood bent at each side, a canvas backrest fastened to the frame by lacing cords, two packboard attachments, shoulder pads, a lashing rope, and quick-release strap and clamp assembly. Irregular-shaped loads can be lashed onto the packboard with rope. Standard loads, such as fiber canisters, are secured using the quick-release straps (Figure 6-16). When using shoulder pads, the soldier places each shoulder strap through the two loops on the surface of one of the pads. He adjusts the straps so the packboard rests high on his back. If it is not heavily loaded, he slings it onto his shoulders and adjusts the shoulder pads for comfort. If it is heavily loaded, he places the packboard upright on the ground. The soldier sits with his back against the canvas and places his arms through the shoulder straps. He rolls over on his hands and knees, and stands up.

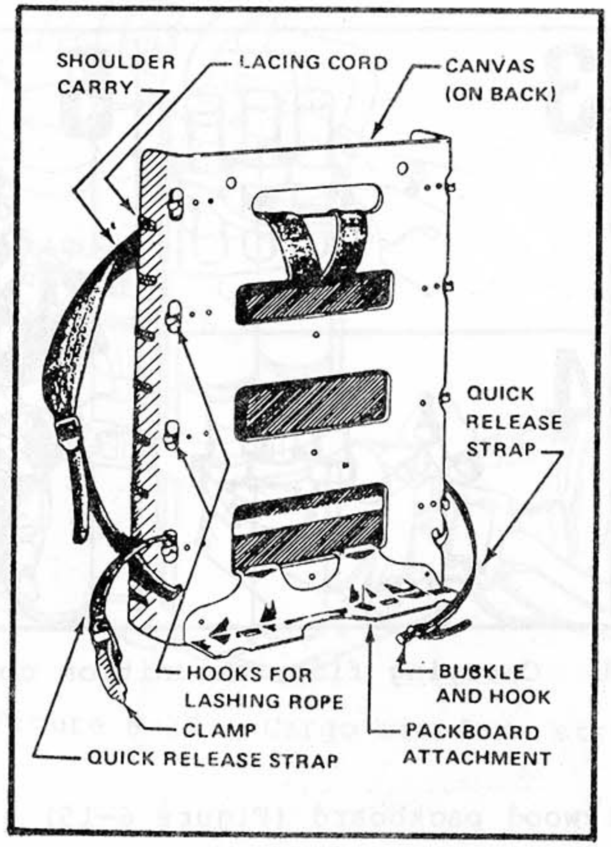

Figure 6-15. Packboard.

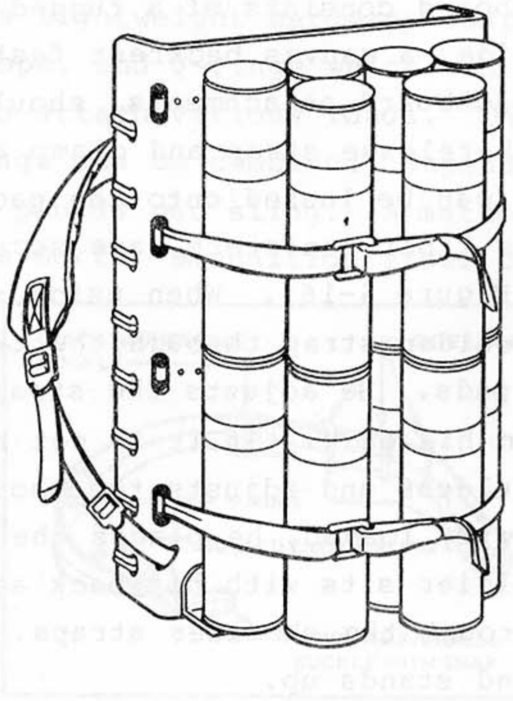

Figure 6-16. Typical packboard load.

(5) In the event that local pack animals are commandeered to carry mortar ammunition, two plywood packboards can be used to substitute for a packsaddle. Lash them together lengthwise. Adjust the length of the lashing to let the packboards hang at a level comfortable for the animal. Pad the packsaddle and secure it with a rope around the front shoulders and a cinch rope (Figure 6-17).

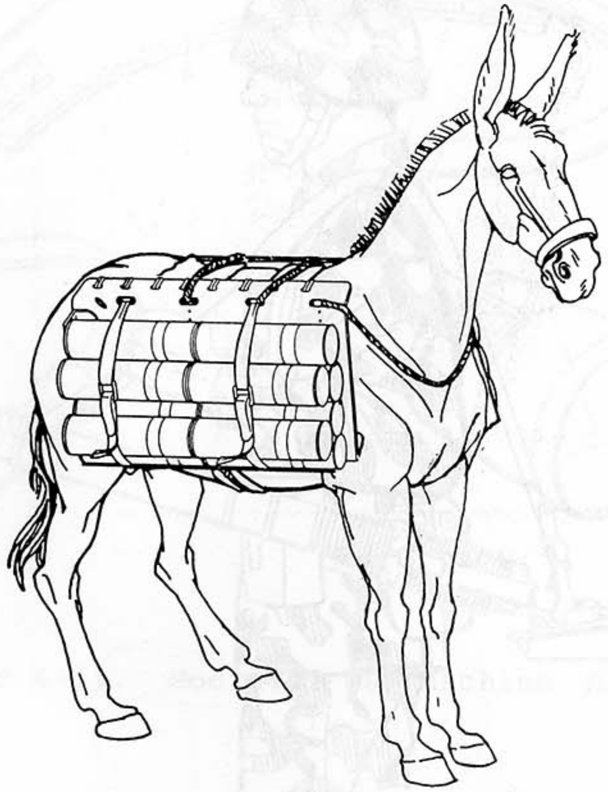

Figure 6-17. Improvised pack saddle.

b. The use of field expedient load carrying techniques is encouraged and only limited by the imagination of the soldiers and leaders involved. Here are five field-expedient methods of carrying loads that the mortar section can use:

(1) The nylon sling issued for carrying the M60 machine gun can be used to carry the M224 mortar. One end of the sling is formed into a loop, using the adjustable buckle. It is then looped around the cannon between the baseplate and the carrying handle. The other end is also looped and placed around the upper

saddle. The mortar is carried across the body, much like the M60 machine gun (Figure 6-18). The carrying sling is never looped through the mortar's own carrying handle. The sling would then interfere with firing the mortar in the trigger-fire mode, and it would be difficult to remove during a fire mission.

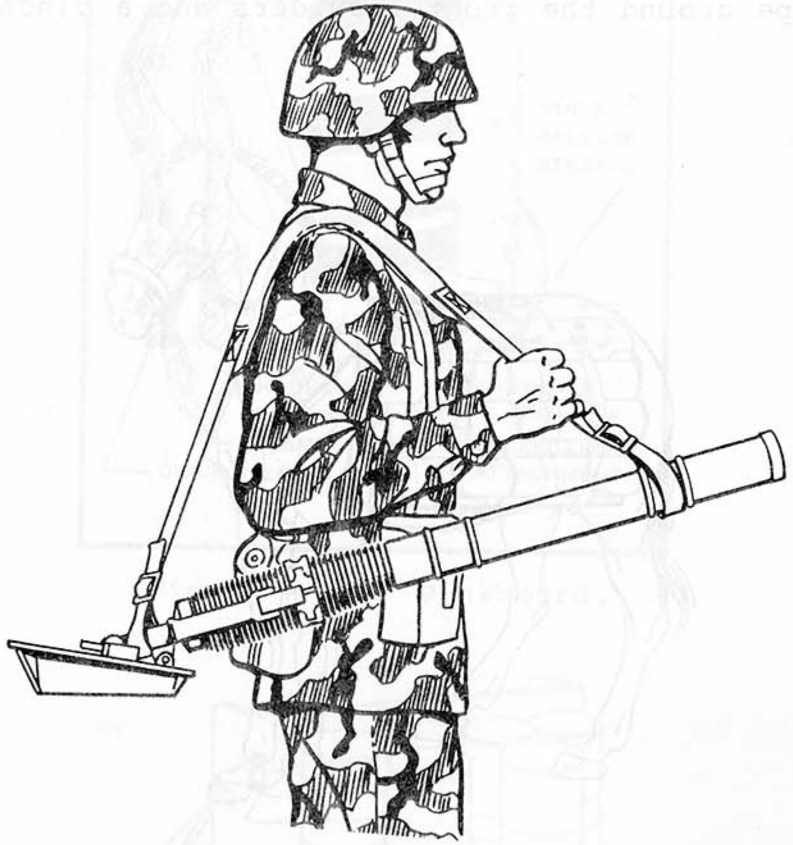

Figure 6-18. M60 machine gun sling.

(2) The M60 machine gun sling can be modified by a direct-support canvas repair unit to make it even more useful as a carrying sling (Figure 6-19). A sewn canvas cup, slightly larger than the tube, can be attached to one end and slipped over the cannon muzzle during transport. It supports the mortar while also preventing dirt, leaves, and other debris from entering the bore and possibly causing a misfire. A sturdy metal hook (locally fabricated) can be placed on the other end of the sling and hooked onto the carrying handle. It holds the mortar during transport

and is quickly and easily removed when the mortar is placed into action.

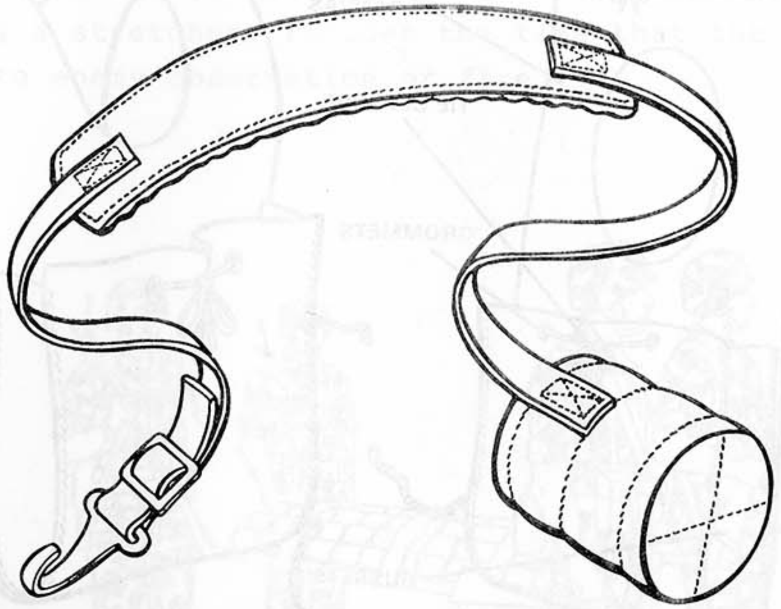

Figure 6-19. Modified M60 machine gun sling.

(3) A canvas repair unit can also fabricate a simple ammunition carrying vest. This type of vest, the M2A1 ammunition bag, was issued to World War II and Korean War 60-mm mortar crews, but it is no longer standard. The vest consists of a piece of sturdy canvas cut and sewn as indicated in Figure 6-20. Simple adjustment straps or ties can be used to secure the vest and ammunition. The hole for the head must be cut large enough to slip quickly over the helmet and protective mask. The vest is worn over the combat load. Fiber containers of mortar ammunition are stacked horizontally both front and back.

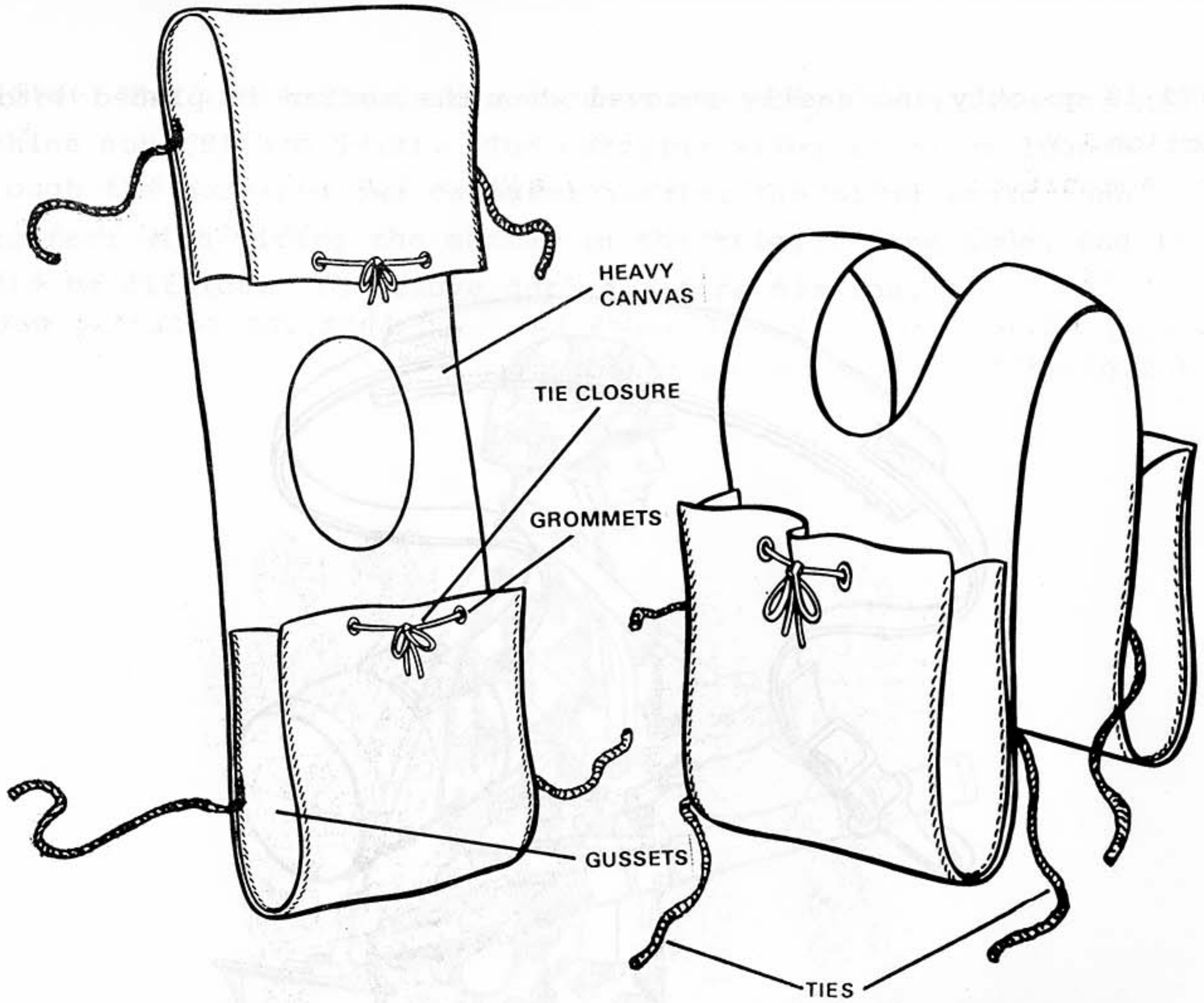

Figure 6-20. Locally fabricated load-carrying vest.

(4) One or two 60-mm mortar rounds can be carried in an empty claymore mine bag. This is a good method to use when other members of the company must carry additional mortar rounds for the section. These can easily be taken off and dropped at the mortar position when needed. They can just as easily be handed back out again if the ammunition is not fired.

(5) For carrying mortar ammunition short distances, a standard army stretcher can be used. A detail of two to four men can carry large amounts of mortar ammunition over rough terrain by lashing it to a stretcher and using universal slings to distribute the load (Figure 6-21). Using the sling frees the hands to carry weapons or negotiate obstacles. Medical personnel should not be used to transport ammunition since doing so violates their status as noncombatants. This technique is useful in circumstances where an ammunition resupply vehicle can approach near the mortar section location, but large amounts of ammunition must still be carried the last few yards. Carrying the ammunition in one or two trips, using a stretcher, reduces the time that the carrying party is exposed to enemy observation or fire.

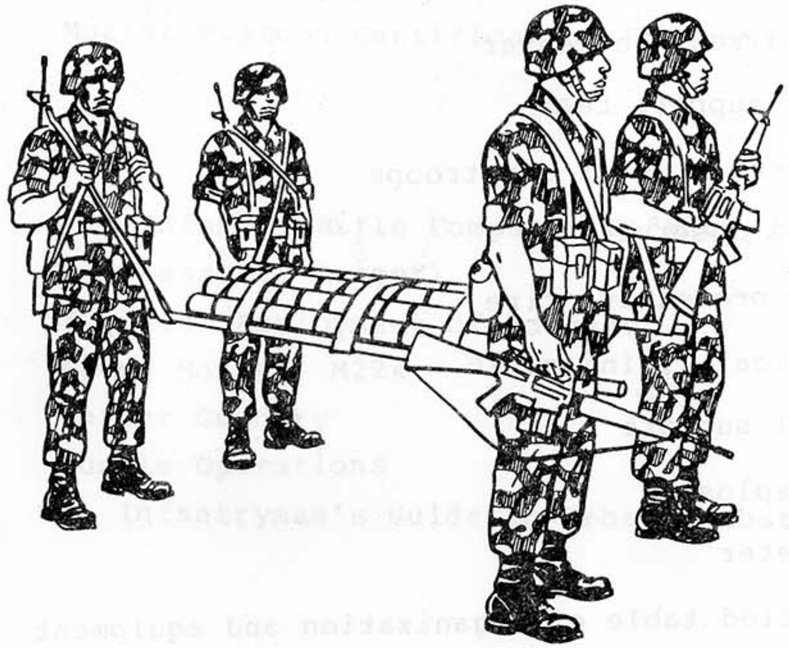

Figure 6-21. Use of stretcher and universal slings.

GLOSSARY

CSR - controlled supply rate

DLIC - detachment left in contact

DLY - delay

FDC - fire direction center

FIST - fire support team

FLOT - forward line of own troops

FO - forward observer

FPF - final protective fire

GFS - graphical firing scale

GS - general support

HE - high explosive

mm - millimeter

MTOE - modified table of organization and equipment

IMP - impact

NSB - near-surface burst

OP - observation post

OT - observer-target

PRX - proximity

RSR - required supply rate

SOP - standing operating procedure

TOE - table of organization and equipment

WP - white phosphorus

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